




3 1761 10374551 9



Digitized by the Internet Archive
in 2023 with funding from
University of Toronto

<https://archive.org/details/31761103745519>

v. Doc.
an
3 m.

Canada. Statistics, 1891-1917
~~Ministry of the Interior~~

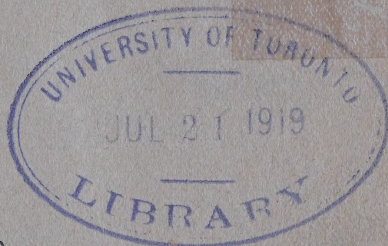
D-28

CANADA
DEPARTMENT OF MINES

HON. MARTIN BURRELL, MINISTER; R. G. McCONNELL, DEPUTY MINISTER.

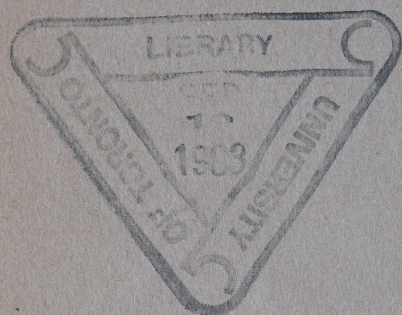
MINES BRANCH
EUGENE HAANEL, PH.D., DIRECTOR.

ANNUAL REPORT
ON THE
MINERAL PRODUCTION OF CANADA
During the Calendar Year
1917



OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1919

No. 504



CANADA
DEPARTMENT OF MINES

HON. MARTIN BURRELL, MINISTER; R. G. McCONNELL, DEPUTY MINISTER.

MINES BRANCH

EUGENE HAANEL, PH.D., DIRECTOR.

ANNUAL REPORT

ON THE

MINERAL PRODUCTION OF CANADA

During the Calendar Year

1917



OTTAWA

J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1919

LETTER OF TRANSMITTAL.

Dr. EUGENE HAANEL,
Director Mines Branch,
Department of Mines,
Ottawa.

SIR,—I beg to hand you, herewith, the Annual Report on the Mineral Production of Canada, giving revised statistical information descriptive of the mining and metallurgical production in Canada during the calendar year 1917.

A preliminary report on the mineral production during 1917 was sent to press February 28, 1918, and issued within the following week.

Parts of the present report—including “A general summary of the Mineral Production of Canada during the calendar year 1917;” “Report on the Production of Iron and Steel in Canada during 1917;” “Report on the Production of Copper, Gold, Lead, Nickel, Silver, Zinc, and other Metals, in Canada during 1917;” “Report on the Production of Coal and Coke in Canada during 1917;” and “Report on the Production of Cement, Lime, Clay Products, Stone, and Other Structural Materials in Canada, during 1917,” have already been separately published.

Mr. A. Buisson has prepared the special chapters on gold, silver, copper, lead, nickel, zinc, and miscellaneous metallic minerals, as usual. Mr. J. Casey has given particular care to the compilation of the statistical tables.

Grateful acknowledgment is made of the co-operation of mine and smelter operators who have, almost without exception, cheerfully complied with our requests, and furnished the department with statistics and information regarding their operations.

I have the honour to be, Sir,

Your obedient servant,
(Signed) JOHN McLEISH.

DIVISION OF MINERAL RESOURCES AND STATISTICS.

January 24, 1919.

CONTENTS.

	PAGE
LETTER OF TRANSMITTAL.....	3
EXPLANATORY NOTES—	
Definition of the terms 'ton' and 'year' used.....	7
Basis of valuation and compilation.....	7
MINERAL PRODUCTION OF CANADA—	
GENERAL SUMMARY—	
Mineral Production in Canada, 1916 and 1917, comparative table.....	10
General table of exports and imports.....	15
Production by provinces, 1916 and 1917.....	19
Mine production.....	26
	METALLIC ORES.
ALUMINIUM—	
Imports and exports.....	32
ANTIMONY—	
Production in Canada: exports and imports.....	34
COBALT—	
Production in Canada.....	36
COPPER—	
Production in Canada: prices, exports and imports: production in Nova Scotia, Quebec, Ontario, British Columbia, and Yukon.....	36
GOLD—	
Refined metal—Production in Canada, production in Nova Scotia, Quebec, Ontario, Alberta, British Columbia, and Yukon.....	47
IRON—	
Iron ore: production in Canada and by provinces; exports and imports.....	58
Pig-iron and steel: production in Canada and by provinces; ferro-products; exports and imports; operating companies.....	65
LEAD—	
Production in Canada; refined pig lead: prices, bounties, exports and imports; production in Ontario and British Columbia.....	8
MERCURY—	
Production in Canada; imports.....	96
MOLYBDENUM—	
Production in Canada.....	96
NICKEL—	
Production in Ontario; exports and imports; prices.....	99
PLATINUM AND PALLADIUM—	
Production in Canada; imports.....	104
SILVER—	
Production in Canada; prices; refined silver; production in Quebec, Ontario, British Columbia, and Yukon.....	108
TIN—	
Imports.....	114
TUNGSTEN—	
Production in Canada.....	115
ZINC—	
Production in Canada; imports, prices.....	116
	NON-METALLIC PRODUCTS.
ABRASIVE MATERIALS; PRODUCTION, EXPORTS AND IMPORTS—	
Corundum: Ontario.....	125
Grindstones: Nova Scotia and New Brunswick.....	126
Tripolite: Nova Scotia.....	127
Artificial abrasives.....	128
ACTINOLITE.....	129

	Page
ARSENIC—	
Production: imports and exports.....	130
ASBESTOS—	
Production in Quebec, prices, exports and imports; world's production.....	132
BARYTES.....	136
CHROMITE—	
Production in Quebec, exports; consumption in United States.....	137
COAL—	
Production in Canada, exports and imports, consumption; production in Nova Scotia, New Brunswick, Saskatchewan, Alberta, British Columbia, and Yukon.....	139
COKE—	
Production in Canada, exports and imports; production in Nova Scotia, Ontario, Alberta, and British Columbia.....	170
FELDSPAR—	
Production in Canada, exports.....	174
FLUORSPAR—	
Production; imports of hydrofluosilicic acid.....	175
GRAPHITE—	
Production in Canada, exports and imports; artificial graphite.....	176
GYPNUM—	
Production in Canada, exports and imports; production in Nova Scotia, New Brunswick, Ontario, and Manitoba.....	178
MAGNESITE.....	183
Magnesium sulphate.....	186
Metallic magnesium.....	186
MANGANESE—	
Production; exports and imports.....	187
MICA—	
Production in Quebec, and Ontario; exports; consumption in United States.....	189
MINERAL PIGMENTS—	
Ochres; production, exports and imports.....	191
MINERAL WATER.....	193
NATURAL GAS—	
Production in New Brunswick, Ontario, and Alberta.....	194
PEAT.....	196
PETROLEUM—	
Bounty; production in Ontario, and New Brunswick; refined oils inspected; exports and imports.....	197
PHOSPHATE—	
Production in Quebec and Ontario; exports.....	204
PYRITES—	
Production in Quebec and Ontario; exports; imports of brimstone and sulphur.....	205
Sulphuric acid, production; imports and exports.....	206
QUARTZ—	
Production; imports of silex.....	209
Uses of Silica.....	209
SALT—	
Production in Ontario; exports, imports, and consumption; operating companies.....	212
TALC.....	215
STRUCTURAL MATERIALS AND CLAY PRODUCTS.	
CEMENT—	
Production; exports, imports, consumption; operating companies.....	218
CLAY PRODUCTS—	
Building, paving and ornamental brick; fireclay, and fireclay products; pottery, sewerpipe, tiles, etc.; production, exports and imports.....	224
LIME—	
Production by provinces; exports and imports.....	240
SAND-LIME BRICK—	
Production.....	244
SAND AND GRAVEL—	
Production, exports and imports.....	245
SLATE—	
Production, exports and imports.....	248
STONE—	
Granite and other igneous rocks, limestones, marble, and sandstone production, exports and imports.....	249

EXPLANATORY NOTES.

The term "ton" used throughout this report signifies a ton of 2,000 pounds; while the year referred to means calendar year, unless otherwise stated. The Government fiscal year formerly ended on the 30th. June; but now terminates on the 31st. March. This change took place in 1907, hence the fiscal period ending March 31, 1907, covers only nine months.

Statistics of exports and imports given throughout this report are compiled from the reports of Trade and Navigation, published by the Customs Department.

The term "production" used throughout this report may in general be interpreted as meaning the quantity sold or shipped. Mineral products mined or manufactured, but not sold or shipped, at the end of the year, are not included as "production." An exception to this usage will be found in reference to pig-iron, in which case the statistics of production represent the quantities made.

The value of the metallic minerals produced, whether refined in Canada or not, is calculated on the basis of the average price of the metal in some recognized market. New York prices have usually been taken as the standard, except in the case of lead, for which the Montreal price is now used. The value of non-metallic products is given as at the mine or point of shipment.

THE MINERAL PRODUCTION OF CANADA

During the Calendar Year

1917

General Summary.

A preliminary report on the mineral production of Canada in 1917 was published on February 26, 1918, the statistical record being at that time partially estimated and therefore subject to revision.

According to the revised statement of mineral production now presented, the total value¹ of the mineral production in 1917 was \$189,646,821. This is less than the total value estimated in the preliminary report, the difference being due to over estimates on the value of coal production.

Compared with the total value of the production in 1916 which was \$177,201,534, that of 1917 shows an increase of 7.02 per cent and in point of value represents the largest output on record. In the preliminary report it was pointed out and may well be repeated that:—

“It must not be inferred, however, that because such a large increase is shown in the value of our mineral production, our mines and quarries have actually increased their tonnage output at the same average rate. In fact, an examination of the record will show that the quantities of many important products were considerably less in 1917 than in 1916, and over two-thirds of the increase in value is to be attributed to nickel, coal, graphite, gypsum, and cement, in which the quantities marketed were less than in the previous year.”

The detailed comparative statement here presented shows the production of each important product during the past two years, the proportion which each contributes to the total production, and the increase or decrease as the case may be of the production in 1917 as compared with that of 1916.

¹ In presenting a total valuation of the mineral production as is here given, it should be explained that the production of the metals, copper, gold, lead, nickel, silver, and zinc, is given as far as possible on the basis of the quantities of metals recovered in smelters, and the total quantities in each case are valued at the average market price of the refined metal in a recognized market. There is thus included in some cases the values that have accrued in the smelting or refining of metals outside of Canada.

Comparative Statement of Mineral Production for Years 1916 and 1917.

Product.	1916.			1917.			Increase (+) or Decrease (-).		Value.	Increase (+) or Decrease (-).	
	Quantity.	Value (a).	Per Cent of Total.	Quantity.	Value (a).	Per Cent of Total.	Quantity.	%			
<i>Metallic.</i>											
Antimony ore	885	94,537	.....	361	22,000	.....	524	59.2	-	72,537	76.7
Antimony refined	107,185	41,823	.....	.....	.....	.....	107,185	100.0	-	41,823	100.0
Cobalt metallic and contained in oxide, etc.	840,536	924,590	0.52	1,079,572	1,727,315	0.91	239,036	28.4	+	802,725	86.8
Copper (b)	117,150,028	31,867,150	17.98	109,227,332	29,687,989	15.65	7,922,696	6.7	-	2,179,161	68.4
Gold	930,492	19,234,976	10.85	738,831	15,272,992	8.05	191,661	20.6	-	3,961,984	20.6
Iron, pig, from Canadian ore (c)	115,691	1,328,605	0.75	46,022	768,783	0.41	69,669	60.2	-	559,822	42.1
Iron ore sold for export (k)	140,608	393,689	0.22	169,252	590,696	0.31	28,644	20.4	+	197,007	50.7
Lead (d)	41,497,615	3,532,692	1.99	32,576,281	3,628,020	1.91	8,921,334	21.5	+	95,328	2.7
Molybdenite	156,461	156,461	0.09	288,705	288,705	0.15	132,244	84.5	+	132,244	84.5
Nickel (e)	82,958,564	29,035,498	16.39	82,330,280	33,732,112	17.79	628,284	0.8	+	4,696,614	16.2
Platinum	15	600	.....	57	3,823	.....	42	280.0	+	3,223	537.0
Silver (f)	25,459,741	16,717,121	9.43	22,221,274	18,091,895	9.54	3,238,467	12.7	+	1,374,774	8.2
Zinc	23,364,760	2,991,623	1.69	29,668,764	2,640,817	1.39	6,304,004	27.0	-	350,906	11.7
Total	.....	106,319,365	60.00	.....	106,455,147	56.13	.....	.....	+	135,782	0.1
<i>Non-metallic.</i>											
Actinolite	250	2,750	.....	120	1,320	.....	130	52.0	-	1,430	52.0
Arsenic, white and in ore	2,186	262,349	0.15	2,936	609,431	0.35	750	34.3	+	407,082	155.2
Asbestos	133,439	5,199,797	2.93	135,502	7,183,099	3.79	2,063	1.5	+	1,983,302	38.1
Asbestos	20,710	29,072	.....	18,279	47,284	.....	2,431	11.7	+	18,212	62.6
Chromite	27,517	311,460	0.18	36,725	499,682	0.26	9,208	33.5	+	188,222	60.4
Coal	14,483,395	38,817,481	21.91	14,046,759	43,199,831	22.78	436,636	3.0	+	4,382,350	11.3
Corundum	67	10,307	.....	188	32,153	.....	121	180.7	+	21,846	211.9
Feldspar	19,488	71,407	.....	19,462	89,826	.....	26	0.1	+	18,419	25.8
Fluorspar	1,284	10,298	.....	4,249	68,756	.....	2,965	230.9	+	58,518	571.6
Graphite	3,955	325,362	0.18	3,714	402,892	0.21	241	6.1	+	77,530	23.8
Graphite, artificial	263	.....	.....	548	.....	.....	285	108.3	.....	.....	.....
Grindstones	3,478	52,782	.....	2,523	45,754	.....	955	27.5	-	7,028	13.3
Gypsum	342,915	738,593	0.42	336,332	881,984	0.47	6,583	1.9	+	143,391	19.4
Magnesite	55,413	563,829	0.32	58,090	728,275	0.38	2,677	4.8	+	164,446	29.2
Magnesium sulphate	.....	.....	.....	929	4,645	.....	929	.....	+	4,645	.....
Manganese	957	89,544	.....	158	14,836	.....	799	83.5	-	74,708	83.4
Mica	(1,208)	255,239	0.14	1,166	358,851	0.19	42	3.5	+	103,612	40.6

Mineral pigments--		Tons		1939		3,490		54,027		2,122		155.1		34,634		178.3	
Barytes.....		1,368		19,393		3,490		54,027		2,122		155.1		34,634		178.3	
Oxides.....		8,811		58,711		9,409		87,605		2,598		6.8		28,894		49.2	
Mineral water.....		25,467,458		127,806		2,233		145,814						18,008		14.1	
Natural gas (g).....	M. cu. ft.	3,958,029		3,958,029		2,233		5,045,298		2,666		7.7		+1,087,269		27.5	
Peat.....	Tons	300		1,500										1,500		100.0	
Petroleum.....	Brls.	198,123		392,284		0.22		542,239		0.28		100.0		149,955		38.2	
Petroleum.....	Tons	2,514		149				1,486		54		26.6		1,028		40.9	
Phosphate.....	Tons	309,251		416,649		0.61		1,610,762		0.85		34.7		526,667		48.6	
Pyrites.....	"	136,743		251,226		0.14		496,182		0.26		53.2		244,956		97.5	
Quartz.....	"	132,903		717,653		0.40		1,047,792		0.55		4.5		330,139		46.0	
Salt.....	"	13,104		49,423				76,539				20.6		27,116		54.9	
Talc.....	"	620		12,139				18,000		20		3.2		5,861		48.3	
Tripolite.....	"																
Total.....				53,414,983		30.14		63,354,363		33.41				+9,939,380		18.6	

Structural Materials and Clay Products.

Cement, portland.....	5,369,560	6,547,728	3·70	4,768,488	7,724,246	4·08	—	601,072	11·2	1,176,518	18·0
Clay products—											
Brick, common	237,034,675	1,826,844	1·03	210,630,576	1,999,465	1·06	—	26,404,099	11·1	172,621	9·4
Brick pressed	44,947,089	442,355	0·28	46,408,946	653,153	0·34	+	1,461,857	3·3	160,798	32·7
Brick, paving	1,589,893	30,144	.....	.....	.....	.....	—	1,589,893	100·0	30,144	100·0
Brick, moulded and ornamental.....	.....	21,102	.....	.....	54,234	.....	.....	.....	.....	33,132	157·0
Fireclay, and fireclay products.....	.....	234,562	0·13	.....	326,511	0·17	.....	.....	.....	91,949	39·2
Fireproofing architectural terra-cotta.....	.....	361,555	0·20	.....	394,733	0·21	.....	.....	.....	33,178	9·2
Kaolin.....	1,750	17,500	.....	533	9,594	.....	—	1,217	69·5	7,906	45·2
Pottery.....	.....	61,069	.....	.....	122,878	.....	.....	.....	.....	61,809	101·2
Sewerpipe.....	.....	716,287	0·40	.....	783,762	0·41	.....	.....	.....	67,475	9·4
Tile, drain.....	.....	359,387	0·20	.....	434,708	0·23	.....	.....	.....	75,321	21·0
Line.....	5,493,250	1,091,463	0·62	6,567,170	1,558,487	0·82	+	1,073,920	19·5	467,024	42·8
Sand-lime brick.....	16,540,747	126,235	.....	18,001,999	201,355	0·11	+	1,461,243	8·8	75,120	59·5
Sand and gravel.....	8,156,297	1,838,227	1·04	9,182,417	2,326,249	1·23	+	1,026,210	12·6	487,929	26·5
Slate.....	.....	6,223	.....	1,422	7,789	.....	+	160	2·7	1,566	25·2

*Short tons throughout. (a) The metals, copper, lead, nickel, silver and zinc are for statistical and comparative purposes valued at the final average value of the refined metal. Pig-iron, zinc ore, and cobalt oxides are valued at the furnace or spot, and non-metallic products at the mine or point of shipment. (b) Copper content of smelter products and estimated recoveries from ores exported, at 27-180 cents per pound, in 1917, and 27-202 cents per pound in 1916. (c) The total production of pig-iron in Canada in 1917 was 1,156,789 tons valued at \$24,290,101, of which, it is estimated, 1,110,707 tons valued at \$23,521,318 should be credited to imported ores; in 1916 the total production was 1,169,257 tons valued at \$16,750,898, of which 1,053,566 tons valued at \$15,422,293 are credited to imported ores. (d) Refined lead and lead contained in base bullion exported at 11-137 cents per pound in 1917, and 8-513 cents in 1916, the average prices in Montreal. (e) Nickel content of matte produced and nickel recovered from silver-cobalt-nickel ores valued at 40 cents in 1917 and 35 cents in 1916. The value of the nickel contained in matte, as returned by the operators, was from 10 to 15 cents per pound for both years. (f) Silver recovered in bullion and recoverable from ores and smelter products, which differ at 81-417 cents per ounce in 1917, and at 65-661 cents in 1916. (g) Gross returns of sale of gas. (h) In 1917 and 1916 figures as reported by the producers, which differ from those of the Trade and Navigation reports.

The total value of the metallic production in 1917 was \$106,455,147 as against a value of \$106,319,365 in 1916, and \$75,814,841 in 1915. While the net change in 1917 was a small increase amounting to only one-tenth of one per cent it will be noted that decreases in the value of production of fine metals aggregating over \$7,170,000 were offset by increases in seven metals aggregating over \$7,300,000.

The total value of the production of non-metallic products in 1917 was \$83,191,674, as against \$70,882,169 in 1916; \$61,294,330 in 1915 and \$79,273,461 in 1914. Thus, while the value of non-metallic products in 1916 was less than the value in 1912 and 1913, that of 1917 was greater than any previous year. Much of this increase is to be credited to higher prices realized for most of these products, though, on the other hand, important increases have been made in the quantities of certain war minerals produced including asbestos, chromite, graphite and pyrites.

The total value of the production in 1886 was \$10,221,255, or about \$2.23 per capita. In ten years the value had increased to \$22,474,256, or \$4.38 per capita, more than twice the total in 1886, and nearly twice the production per capita. The next ten years witnessed an increase to \$79,286,697 in 1906, or \$12.81 per capita, about 3½ times the production in 1896. From 1906 to 1917 the total production has shown an increase of over 139 per cent.

The record of annual mineral production in Canada since 1886 and the total annual production of metallic and non-metallic products since 1907 are shown in the following tables:—

Annual Mineral Production in Canada since 1886.

Year.	Value of production.	Value per capita.	Year.	Value of production.	Value per capita.
	\$	\$		\$	\$
1886.....	10,221,255	2.23	1902.....	63,231,836	11.36
1887.....	10,321,331	2.23	1903.....	61,740,513	10.83
1888.....	12,518,894	2.67	1904.....	60,082,771	10.27
1889.....	14,013,113	2.96	1905.....	69,078,999	11.49
1890.....	16,763,353	3.50	1906.....	79,286,697	12.81
1891.....	18,976,616	3.92	1907.....	86,865,202	13.75
1892.....	16,623,415	3.39	1908.....	85,557,101	13.16
1893.....	20,035,082	4.04	1909.....	91,831,441	13.70
1894.....	19,931,158	3.98	1910.....	106,823,623	14.93
1895.....	20,505,917	4.05	1911.....	103,220,994	14.42
1896.....	22,474,256	4.38	1912.....	135,048,296	18.27
1897.....	28,485,023	5.49	1913.....	145,634,812	18.77
1898.....	38,412,431	7.32	1914.....	128,863,075	15.96
1899.....	49,234,005	9.27	1915.....	137,109,171	.....
1900.....	64,420,877	12.04	1916.....	177,201,534	.....
1901.....	65,797,911	12.16	1917.....	189,646,821	.....

Annual Values of Metallic and Non-Metallic Production.

Year.	Metallic.	Non-Metallic.		Total.
		Fuels and other Non-Metallics.	Structural or clay and stone quarry products.	
	\$	\$	\$	\$
1907	42,426,607	31,275,546	12,863,049	(a) 86,865,202
1908	41,774,362	32,142,784	11,339,955	(a) 85,557,101
1909	44,156,841	31,141,251	16,533,349	91,831,441
1910	49,438,873	37,757,158	19,627,592	106,823,623
1911	46,105,423	34,405,960	22,709,611	103,220,994
1912	61,172,753	45,080,674	28,794,869	135,048,296
1913	66,361,351	48,463,709	30,809,752	145,634,812
1914	59,386,619	43,467,229	26,009,227	128,863,075
1915	75,814,841	43,373,571	17,920,759	137,109,171
1916	106,319,365	53,414,983	17,467,186	177,201,534
1917	106,455,147	63,354,363	19,837,311	189,646,821

(a) Total includes \$300,000 allowed for products not reported.

The production of pig-iron given in the general table includes only that proportion of the output of Canadian blast furnaces credited to Canadian ores. There is an important production of pig-iron from imported ores (shown in the footnotes to the general table and in the chapter on iron and steel) and the total value thereof in 1917 was exceeded only by the production of coal, copper, and nickel. There is also a large production of aluminium from imported ores for which no value is included, in the general table of production.

Exports and Imports.

A very large portion of the mineral production of Canada is exported for consumption or refining outside of Canada. On the other hand considerable quantities of mine products, chiefly those which have been refined or subjected to partial treatment, or in the form of manufactured goods ready for consumption, are imported.

The total value of the exports of products of the mine including direct mine products and manufactures thereof in 1917 was \$167,805,818, compared with \$171,178,583 in 1916. This value includes for 1917 mine products to the value of \$77,069,667 and manufactures valued at \$90,736,151, as against mine products valued at \$80,755,461 and manufactures valued at \$90,423,122 in 1916.

Practically the whole of the Canadian production of copper, nickel, and silver is exported, also a very large proportion of the production of gold, asbestos, and mica. There are, as well, considerable exports of coal. These products alone contribute about 90 per cent of the value of the mine products exported. Manufactured products exported consist chiefly of iron and steel goods, agricultural implements, aluminium, calcium carbide, acetate of lime, fertilizers, and coke.

The United States is the chief destination of Canada's mine exports, about 77 per cent having been exported to that country during the fiscal year 1916-17, and about 20 per cent to the United Kingdom.

A great variety of mineral products, chiefly in the manufactured or semi-manufactured condition, are annually imported into Canada. These imports increased in value with great rapidity during the ten years preceding 1913. During the next two years, however, there was a falling off, but in 1916 the imports again increased to a value almost equal to that of 1913. The total value of these imports during the calendar year 1917 has greatly exceeded those of any previous year and amounted to \$353,660,555, as compared with a value of \$256,346,726 in 1916; \$146,465,510 in 1915; \$181,675,667 in 1914, and \$259,299,745 in 1913.

It is perhaps significant that of the total value of these imports in 1917 over one-half was comprised in iron and steel goods and nearly 30 per cent in coal, coke, and petroleum.

Exports of Products of the Mine and Manufactures of Mine Products, Calendar Year, 1916 and 1917.

Products.	1916.		1917.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Arsenic..... Cwt.	39,505	197,458	45,724	507,898
Asbestos..... Tons.	96,775	3,872,463	93,932	4,903,326
Asbestos sand and waste..... "	33,564	241,272	52,088	430,956
Coal..... "	2,135,359	7,099,387	1,733,156	7,387,192
Cobalt (nine months only).....		712,880		1,542,945
Chromite (chromic ore)..... Tons.	12,633	152,534	19,229	342,528
Corundum..... "	56	8,583	142	22,578
Feldspar, magnesite, talc, etc.....		329,215		410,007
Gold-bearing quartz, dust, nuggets, etc.....		18,382,903		15,929,051
Gypsum or plaster, crude..... Tons.	221,156	252,476	224,423	245,182
Metals, viz :—				
Copper, fine, contained in ore, matte, regulus, etc..... Cwt.	1,249,424	20,776,536	865,569	14,183,264
Lead, metallic, contained in ore, etc. "	90,484	558,180	134,104	925,056
Molybdenite (9 mos.)..... "			647	81,173
Nickel, fine, contained in ore, matte, or speiss..... "	804,417	8,662,179	812,724	8,708,650
Platinum, contained in concentrates or other forms..... Ozs.	532	41,945	136	11,309
Silver, metallic, contained in ore concentrates, etc..... "	25,279,359	15,637,885	21,718,784	17,621,398
Mica..... Lbs.	1,308,793	379,720	1,271,460	451,345
Mineral pigments, iron oxides, ochres..... Cwt.	33,917	25,312	29,022	30,052
Mineral water, natural, not in bottles..... Gals.	229	22	75	20
Mineral wax..... Cwt.	80,987	201,653	72,337	401,331
Oil :—				
Mineral, coal and kerosene, crude... Gals.	137,647	11,439	2,130	183
Mineral, coal and kerosene, refined.. "	446,595	48,137	28,212	6,558
Gasoline and naphtha..... "	54,806	14,194	24,304	7,419
Ores :—				
Antimony..... Tons.	794	48,158	774	50,476
Iron..... "	161,260	541,779	164,004	660,673
Manganese..... "	957	89,544	185	16,031
Zinc (9 mos.)..... "			5,972	320,296
Other..... "	69,331	1,348,540	60,863	683,380
Phosphates..... "	103	1,543	14	200
Plumbago, crude ore and concentrates..... Cwt.	6,223	13,114	2,232	7,455
Pyrites..... Tons.	156,722	557,024	279,646	974,200
Salt..... Cwt.	3,059	2,226	172,850	94,364
Sand and gravel..... Tons.	1,114,913	388,309	1,075,374	290,964
Stone, ornamental, granite, marble, etc., unwrought..... "	15,967	7,989	330	359
Stone, building, freestone, limestone etc., unwrought..... "	128,453	103,796	139,153	122,430
Stone, crushed..... "	26,754	27,611	2,308	2,277
Stone, for manufacture of grindstones, rough..... "	356	1,764	310	2,062
Other articles of the mine.....		17,694		15,375
Total mine products.....		80,755,461		77,889,963
MANUFACTURES.				
Abrasives, artificial (9 months).....				1,249,513
Agricultural implements and machines, viz :				
Mowing machines..... No.	6,672	233,024	12,149	486,593
Cultivators..... "	4,219	142,028	6,336	170,611
Reapers..... "	1,115	65,011	2,771	188,897
Drills..... "	4,713	317,831	6,240	314,435
Harvesters and binders..... "	7,495	814,517	9,502	1,158,757
Ploughs..... "	17,760	483,650	25,354	1,150,386
Harrows..... "	6,691	97,214	4,093	93,609
Hay rakes..... "	2,011	43,746	4,704	116,395
Seeders..... "	2	128	26	2,621
Threshing machines..... "	1,522	465,209	1,172	274,764
All others.....		292,603		297,640
Parts.....		750,966		1,025,275

Exports of Products of the Mine and Manufactures of Mine Products, Calendar Year, 1916 and 1917—*Concluded.*

Products.	1916.		1917.	
	Quantity.	Value.	Quantity.	Value.
MANUFACTURES.—<i>Con.</i>		\$		\$
Asbestos, manufactures of.....		4,741		55,666
Bricks..... M.	1,746	13,942	4,464	40,039
Cement.....		2,424		16,857
Clay, manufactures of.....		58,550		83,600
Coke..... Tons.	48,539	221,334	23,595	137,318
Cream separators.....		34,567		150,923
Drugs, chemicals and medicines, viz:—				
Acetate of lime..... Cwt.	73,589	216,397	67,607	246,042
Acid sulphuric.....	31,517	74,527	189,551	197,888
Ammonium sulphate (9 months).....			160,947	693,377
Calcium carbide.....	1,469,663	4,369,085	1,629,827	4,027,894
Cyanamid (9 mos.).....			749,955	1,837,959
Phosphorus..... Lbs.	834,950	122,823	1,121,835	185,767
Earthenware and manufactures of.....		7,620		14,504
Fertilizers.....		3,338,413		1,253,667
Gasoline engines and parts of..... No.	529	86,310	800	152,275
Grindstones, manufactured.....		43,178		29,242
Gypsum or plaster, ground.....		154,630		146,384
Iron and steel and manufactures of, viz:—				
Stoves of all kinds.....		29,956		50,451
Gas buoys and parts of.....		2,484		85
Castings, n.o.p.....		167,881		533,297
Ferro-silicon and ferro compounds.. Tons.	22,802	1,352,013	33,212	2,616,924
Pig-iron.....	23,304	374,383	12,081	423,814
Linotype machines and parts of.....		35,465		6,977
Machinery, n.o.p., and parts of.....		1,206,863		2,499,581
Sewing machines, and parts of..... No.		82,032		157,809
Washing machines, domestic and wringers.....		5,763		6,400
Typewriters..... No.	3,597	246,761	1,883	97,904
Scrap iron or steel..... Cwt.	2,285,991	1,357,018	3,531,826	2,300,022
Bars and rods (9 mos.)..... Tons.			41,321	3,633,787
Billets, blooms, ingots (9 mos.).....			41,558	1,831,917
Rails (9 mos.).....			26,402	1,605,742
Hardware, viz:—				
Wire and wire nails..... Cwt.	2,450,517	8,597,320	2,109,637	9,823,700
Tools, hand or machine.....		376,549		940,347
Hardware, n.o.p.....		515,613		917,177
All other iron or steel, n.o.p.....		38,974,154		7,000,678
Lime.....		66,406		74,523
Metals:—				
Aluminium in bars, blocks, etc..... Cwt.	184,253	5,201,066	223,246	7,620,953
Aluminium, manufactures of.....		26,780		17,165
Brass, old and scrap..... Cwt.	375,037	6,064,779	595,000	9,615,627
Copper in pigs, bars, sheets, etc.....	24,304	581,268	175,706	4,776,025
Copper, old and scrap.....	58,466	1,284,895	157,939	4,296,989
Lead in pigs, etc.....	1,121	7,710	10,045	62,453
Metallic shingles and laths and corrugated roofing.....		30,563		41,084
Plated ware, n.o.p.....		15,050		23,164
Platinum, old and scrap (9 mos.)..... Ozs.			195	18,290
N.o.p.....		3,143,135		5,611,556
Mineral and aerated waters in bottles.....		1,576		10,745
Oil, n.o.p..... Gals.	3,391,857	1,038,025	4,264,160	1,041,467
Plumbago, manufactures of.....		304,919		384,505
Stone of all kinds, dressed.....		4,592		1,816
Tar.....		50,352		43,547
Tin, manufactures of.....		16,284		88,844
Vehicles:—				
Automobiles..... No.	12,579	6,078,668	9,492	4,561,875
" parts of.....		672,060		2,035,769
Bicycles..... No.	580	50,894	454	61,984
" parts of.....		5,877		52,260
Total Manufactures.....		90,423,122		90,736,151
Grand Total.....		171,178,583		168,126,114

EXPORTS.

Showing Destination of Mine Products during the Fiscal Years, 1914-15, 1915-16, and 1916-17.

Destination.	1914-15. Value.	1915-16. Value.	1916-17. Value.
<i>British Empire.</i>	\$	\$	\$
United Kingdom	12,219,937	12,425,248	15,545,227
Australia	125,903	122,409	53,297
Bermuda		5	210
British South Africa	8,092	43,397	27,151
" Guiana		28,812	109,590
" India	612		119,559
" E. Indies, other	4,404		37,567
" W. Indies	1,552	9,170	60
Gibraltar	1,974	3,301	55,828
Hong Kong	213,254	498,991	263,812
Newfoundland	516,756	806,726	919,300
New Zealand	130	695	12,639
Total British Empire	13,092,614	13,943,754	17,144,240
<i>Other Countries.</i>			
Alaska	243,231	295,169	347,124
Argentina	3,447	102	132
Austria Hungary	37,124		
Belgium	45,668		
Brazil	3,159		135
Chili			6,991
China	94,203	368,199	135,483
Cuba	1,461	7,304	5,194
Denmark	611		7,646
Egypt			3,312
France	91,857	186,868	555,589
French W. Indies			900
Germany	290,276		
Greece		914	4,644
Greenland, Iceland, etc		4,957	
Hawaii	26,262	1,804	
Holland	87,207	5,130	17,923
Italy	41,353	154,783	212,938
Japan	69,483	61,016	146,440
Mexico	1,928	9,393	
Miquelon and St. Pierre	36,519	40,919	22,107
Norway	2,662		
Panama	3,891		
Peru		237	
Philippines	5,257		
Porto Rico		2,016	
Portugal	633		
Russia	2,678	62,687	24,885
San Domingo			6,456
Spain	911	9,900	
Sweden	345	9,001	
United States	37,558,209	51,425,708	66,974,768
Total other countries	38,648,375	52,646,107	68,472,667
Grand total	51,740,989	66,589,861	85,616,907

IMPORTS.

Imports of Products of the Mine and Manufactures of Mine Products—Calendar Years 1915, 1916, and 1917.

Products	1915. Value.	1916. Value.	1917. Value.
	\$	\$	\$
Alumina.....	892,634	1,114,061	1,866,240
Alum, alum cake and chloralum.....	196,685	471,836	423,903
Aluminium and manufactures.....	722,235	671,096	560,481
Ammonia, nitrate of.....		202,153	283,853
Ammonia, sulphate of.....	14,637	9,672	26,062
Antimony regulus.....	344,918	208,450	61,732
Antimony salts.....	10,320	13,891	6,295
Arsenic, oxide and sulphide of.....	6,072	18,925	54,196
Asbestos.....	168,894	334,670	537,431
Asphaltum.....	570,295	563,446	454,403
Bells and gongs.....	43,205	72,420	84,021
Bismuth.....	9,004	8,608	12,922
Blanc fixe and satin white.....	59,471	86,306	90,482
Blast furnace slag.....	14,067	4,602	7,106
Borax.....	164,180	265,933	381,294
Brick and tile.....	488,288	390,467	442,455
Brick, fire, of a kind not made in Canada, and n.o.p.....	813,071	1,657,792	3,156,591
Bromine and bromides.....	530	413	530
Burrstones.....	314	648	910
Cement, portland, and manufactures.....	47,836	43,747	28,356
Chalk, Cornwall stone, feldspar, fluorspar, magnesite, mica, schist.	100,012	170,498	264,220
Clays: china, fire, pipe and all other.....	237,096	325,494	416,209
Coal: anthracite, bituminous, slack and run-of-mine.....	28,345,605	38,289,666	70,562,357
Coke.....	1,608,464	2,229,078	6,517,260
Coke, ground for electric batteries.....	12,266	8,119	15,239
Copper and manufactures of.....	3,957,770	7,566,080	10,015,561
Cryolite.....	61,312	78,916	101,141
Crucibles, clay or plumbago.....	106,761	520,341	798,044
Chloride of lime.....	112,142	158,546	100,884
Cyanides of potassium, sodium, cyanogen, or cpd. of bromine.....	367,329	507,021	505,294
Diamonds, unset, and bort.....	709,154	1,332,957	1,368,887
Earthenware.....	1,460,010	2,180,414	2,595,582
Earths, crude.....	1,811	4,074	3,917
Electric carbons.....	40,685	58,676	65,225
Emery.....	206,732	367,719	632,836
Fertilizers, compound or manufactured.....	734,952	639,884	1,045,140
Flint, quartz, silex, etc.....	54,493	90,280	77,104
Foundry facings.....	9,855	27,638	47,416
Fullers earth.....	12,321	13,072	17,004
Fossils.....	4,000	2,699	6,943
Gannister.....	2,462	2,833	23,954
Gold and silver and manufactures of.....	1,829,953	20,016,288	2,921,018
Graphite and manufactures of.....	45,117	103,150	171,209
Grindstones.....	79,391	122,291	185,607
Gypsum and plaster of Paris.....	25,819	43,291	35,460
Hydrofluosilicic acid.....	36,085	28,611	97
Iron and steel—Total, 1915, 74,308,983			
1916, 129,040,248			
1917, 186,538,538			
Pig-iron.....	624,200	1,145,150	2,764,165
Ferro products and chrome steel.....	820,976	1,893,879	2,045,595
Ingots, blooms, billets, puddled bars, etc.....	1,270,687	895,446	1,401,782
Scrap iron and scrap steel.....	127,614	179,751	454,079
Plates and sheets.....	7,647,560	12,806,856	17,582,700
Tin plates and sheets.....	2,883,951	5,221,163	9,985,631
Bars, rods, hoops, bands, etc.....	5,829,088	13,362,807	22,567,187
Structural iron and steel.....	3,615,333	8,042,127	15,282,012
Rails and connexions.....	379,218	470,023	944,595
Pipes and fittings.....	110,978	165,576	143,124
Nails and spikes.....	86,876	283,007	892,021
Wire.....	2,175,834	4,305,674	4,409,376
Forging castings and manufactures.....	1,932,370	3,343,559	5,976,313
Other iron and steel products.....	46,804,298	76,975,990	102,089,958
Iron ore.....	2,331,755	4,419,013	5,124,889

IMPORTS.

Imports of Products of the Mine and Manufactures of Mine Products—Calendar Years 1915, 1916, and 1917—*Continued.*

Products.	1915. Value.	1916. Value.	1917. Value.
	\$	\$	\$
Iron sand.....	3,263	15,641	36,737
Kainite.....	146	5,016	38,828
Lead and manufactures; litharge.....	2,482,916	2,077,896	1,732,428
Lime.....	98,040	96,332	78,251
Lithographic stone.....	1,316	2,768	3,921
Manganese, oxide of.....	46,678	63,786	92,616
Magnesia.....	9,695	20,651	16,186
Meerschaum.....	73		
Mercury or quicksilver.....	159,284	74,461	76,322
Metallic alloys:—			
Babbitt metal.....	16,703	20,524	36,444
Brass and manufactures of.....	3,177,942	4,676,374	5,328,659
Britannia metal and manufactures.....	11,198	25,192	20,513
German silver, nickel, and nickel silver.....	274,706	414,410	519,064
Type metal.....	1,838	2,126	1,193
Mineral and bituminous substances.....	123,726	344,743	647,444
Mineral water, including aerated water.....	126,569	130,933	108,444
Nickel anodes.....	9,571	6,019	8,348
Ochres, etc.....	284,749	409,258	417,502
Ores of metals, n.o.p.....	962,999	2,844,277	3,221,267
Paraffin wax.....	40,965	70,308	140,722
Paraffin candles.....	27,552	30,539	75,257
Petroleum and products of.....	7,979,264	14,604,476	22,741,709
Phosphate, rock (fertilizer).....	14,148	16,182	62,543
Platinum and manufactures of.....	84,087	88,543	114,279
Potash and manufactures of.....	206,575	150,735	135,836
Precious stones.....	132,173	207,621	192,748
Pumice.....	18,814	34,554	34,162
Salt.....	517,526	694,835	1,083,205
Saltpetre.....	279,692	101,103	163,556
Sand and gravel.....	120,756	183,894	312,403
Slate and manufactures of.....	108,676	96,776	106,893
Sand paper.....	133,677	247,317	331,776
Soda products: barilla, bichromate, caustic, sal and salt cake.....	858,364	2,079,859	3,096,578
Stone and manufactures of (including marble).....	539,173	587,304	764,658
Soda, nitrate of.....	1,050,648	2,973,473	1,935,698
Sulphate of iron (copperas).....	5,302	11,549	9,952
Sulphur and phosphorus.....	509,889	1,229,356	1,549,828
Sulphuric acid.....	4,872	115,173	15,680
Talc.....	1,866	(a)	(a)
Tar, coal and pine.....	151,377	184,286	208,065
Tin and manufactures of (including tinware).....	1,634,796	2,999,675	5,656,665
Whiting and prepared chalk.....	109,551	181,349	261,812
Zinc and manufactures of.....	2,775,358	3,690,577	3,641,272
	146,465,510	256,346,726	353,660,555

(a) Not separately recorded.

Production by Provinces.

A summary of the mineral production by provinces in 1916 and 1917 is shown in the accompanying tables in the first of which the total production in the several provinces and the percentages of each are given for the past three years.

In comparing the relative productions of the various provinces it should be remembered that Nova Scotia is not credited with the large production of pig-iron and steel at Sydney and Sydney Mines, which is made almost entirely from imported iron ores and is not naturally credited as Canadian mine product. Similarly a large proportion of the pig-iron production in Ontario is excluded from the total value, because

it is derived from imported ores. The Province of Quebec, also, is not credited with the production of aluminium at Shawinigan Falls, which is made from imported bauxite.

Mineral Production by Provinces, 1915, 1916, and 1917.

Province.	1915.		1916.		1917.	
	Value of production.	Per cent of total.	Value of production.	Per cent of total.	Value of production.	Per cent of total.
	\$		\$		\$	
*Nova Scotia	18,088,342	13.19	20,042,262	11.31	21,104,542	11.13
New Brunswick	903,467	0.66	1,118,187	0.63	1,435,024	0.76
Quebec	11,619,275	8.48	14,406,598	8.13	17,400,077	9.18
Ontario	61,071,287	44.54	80,461,323	45.41	89,066,600	46.96
Manitoba	1,318,387	0.96	1,823,576	1.03	2,628,264	1.39
Saskatchewan	451,933	0.33	590,473	0.33	860,651	0.45
Alberta	9,909,347	7.23	13,297,543	7.50	16,527,535	8.71
British Columbia	28,689,425	20.92	39,969,962	22.56	36,141,926	19.06
Yukon	5,057,708	3.69	5,491,610	3.10	4,482,202	2.26
Dominion	137,109,171	100.00	177,201,534	100.00	189,646,821	100.00

*Includes a small production of lime from Prince Edward Island.

Mineral Production of Nova Scotia, 1916 and 1917.

Product.		1916.		1917.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Gold	Ozs.	4,562	94,305	2,210	45,635
Barytes	Tons	1,368	19,393	3,490	54,027
Coal	"	6,912,140	18,514,662	6,327,091	19,410,737
Grindstones	"	273	5,800	375	9,875
Gypsum	"	238,212	278,160	215,472	301,261
Manganese	"	646	70,371	158	14,836
Molybdenite	Lbs.			94	94
Tripolite	Tons	620	12,139	600	18,000
Clay products			238,470		331,542
Lime	Bus.	911,534	182,506	986,106	197,344
Stone			459,298		569,521
Other products			167,158		151,620
Total			20,042,262		21,104,542

The total production of pig-iron in Nova Scotia in 1917 was 472,147 tons valued at \$10,387,234, and in 1916, 470,055 tons valued at \$7,050,825.

Mineral Production of New Brunswick, 1916 and 1917.

Product.		1916.		1917.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Silver	Ozs.			400	326
Copper	Lbs.			33,920	9,219
Coal	Tons	143,540	386,016	189,095	708,010
Grindstones	"	3,205	46,982	2,148	35,879
Gypsum	"	39,546	153,064	38,556	191,631
Manganese ore	"	(a)			
Natural gas	M. cu. ft.	610,118	79,628	796,775	103,735
Petroleum	Bl.	1,345	2,663	2,341	5,460
Clay products			42,831		51,304
Lime	Bus.	424,113	104,635	532,251	171,248
Stone			112,257		111,150
Other products			190,061		47,062
Total			1,118,187		1,435,024

(a) Included in "Other products."

Mineral Production of Quebec, 1916 and 1917.

Product.		1916.		1917.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Molybdenite.....	Lbs.	(b)		216,693	216,693
Copper.....	"	5,703,347	1,551,424	5,015,560	1,363,229
Gold.....	Ozs.	1,034	21,375	1,511	31,235
Iron ore, sold for export	Tons.	3,209	8,308	16,488	48,599
Lead.....	Lbs.	698,760	59,485	1,378,001	153,468
Silver.....	Ozs.	98,610	64,748	136,194	110,885
Zinc.....	Lbs.	1,663,200	212,956	1,786,740	159,038
Asbestos and asbestic.....	Tons.	154,149	5,228,869	153,771	7,228,233
Chromite.....	"	27,517	311,480	36,725	499,682
Feldspar.....	"	4,610	18,075	1,188	8,204
Graphite (a).....	"	479	75,776	541	106,305
Magnesite.....	"	54,778	554,304	58,090	728,275
Mica.....	"		192,343		286,730
Mineral water.....	Gall.	93,782	16,223		9,201
Iron oxides.....	Tons.	8,811	58,711	9,409	87,605
Phosphate.....	"	190	2,340	123	1,230
Pyrates ..	"	130,639	523,272	122,882	501,351
Quartz.....	"	1,149	1,436	550	1,788
Cement.....	Bls.	2,150,475	2,525,863	2,079,625	3,274,989
Clay products.....			976,164		973,716
Kaolin.....	Tons.	1,750	17,500	533	9,594
Lime ..	Bus.	1,498,845	267,119	1,470,486	335,012
Slate.....	Squares.	1,262	6,223	1,422	7,789
Stone.....			1,370,465		991,593
Other products.....			342,159		265,633
Total..			14,406,598		17,400,007

There was also in this Province an important production of aluminium from imported ores.

(a) Includes production from Baffin Land.

(b) Included in "other products."

Mineral Production of Ontario, 1916 and 1917.

Product.		1916.		1917.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Asbestos.....	Tons			10	2,150
Cobalt, metallic and in oxide, etc.....	Lbs.	840,536	924,590	1,079,572	1,727,315
Copper.....	"	44,997,035	12,240,094	42,867,774	11,651,461
Gold.....	Ozs.	492,481	10,180,485	423,261	8,749,581
Iron ore, sold for export.....	Tons	137,399	385,381	152,764	542,097
Iron, pig, from Canadian ore (a).....	"	115,691	1,328,605	46,022	768,783
Lead.....	Lbs.	685,932	58,393	1,586,711	176,712
Molybdenite.....	"	(b)		68,213	68,213
Nickel.....	"	82,953,564	29,035,498	84,330,280	33,732,112
Silver.....	Ozs.	21,608,158	14,188,133	19,301,835	15,714,975
Actinolite.....	Tons	250	2,750	120	1,320
Arsenious oxide.....	"	2,186	262,349	2,656	658,231
Corundum.....	"	67	10,307	188	32,153
Feldspar.....	"	14,878	53,332	18,274	81,622
Fluorspar.....	"	1,284	10,238	4,249	68,756
Graphite.....	"	3,476	249,586	3,173	296,587
Gypsum.....	"	30,668	116,086	48,947	130,138
Mica.....	"		62,896		72,121
Mineral water.....	"		110,333		135,231
Natural gas.....	M. cu. ft.	17,953,109	2,765,105	19,868,036	3,641,587
Peat.....	Tons	300	1,500		
Petroleum.....	Bls.	196,778	389,621	202,991	473,477
Phosphate.....	Tons	13	174	26	256
Pyrites.....	"	177,552	555,523	288,058	1,080,866
Quartz.....	"	94,519	167,636	177,983	362,251
Salt.....	"	132,903	717,653	138,909	1,047,792
Talc.....	"	13,051	48,575	15,778	76,139
Cement.....	Bls.	2,230,386	2,312,677	1,676,904	2,267,610
Clay products.....	"		2,145,036		2,575,304
Lime.....	Bus.	2,031,396	367,115	2,846,850	668,368
Sand-lime brick.....	No.	11,638,150	77,726	10,667,600	100,885
Stone.....	"		857,023		992,455
Other products.....	"		836,903		1,170,052
Total.....			80,461,823		89,066,600

(a) The total production of pig-iron in Ontario in 1917 was 698,333 tons, valued at \$14,638,726; in 1916, 699,202 tons, valued at \$9,700,073.

(b) Included under "Other products."

Mineral Production of Manitoba, 1916 and 1917.

Product.		1916.		1917.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Copper.....	Lbs.			1,116,000	303,329
Gold.....	Ozs.			440	9,095
Silver.....	"			7,201	5,863
Calcined gypsum.....	Tons	28,489	191,283	33,347	258,934
Clay products.....	"		104,248		114,651
Lime.....	Bus.	355,301	83,754	393,932	92,932
Cement.....	Bls.	427,293	794,897	544,949	1,175,669
Sand-lime brick.....	No.	3,215,097	33,048	5,070,500	76,742
Stone.....	"		372,894		301,968
Other products.....	"		243,452		280,081
Total.....			1,823,576		2,628,264

Mineral Production of Saskatchewan, 1916 and 1917.

Product.	1916.		1917.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Coal..... Tons	231,300	441,836	355,445	662,451
Clay products.....		78,668		78,251
Sand-lime brick..... No.	990,000	9,890	674,500	7,674
Other products.....		60,079		112,275
Total.....		590,473		860,651

Mineral Production of Alberta, 1916 and 1917.

Product.	1916.		1917.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Gold..... Ozs.	82	1,695		
Coal..... Tons.	4,559,054	11,386,577	4,735,363	14,153,685
Natural gas..... M. cu. ft.	6,904,231	1,113,296	6,744,130	1,299,976
Petroleum..... Bls.			8,500	63,302
Cement..... "	275,727	477,832	259,423	567,969
Clay products.....		225,140		309,991
Lime..... Bus.	78,019	20,033	104,540	35,516
Sand-lime brick..... No.	697,500	5,571	1,547,590	15,703
Stone.....		257		7,482
Other products (a).....		67,142		73,911
Total.....		13,297,543		16,527,535

(a) Includes in 1917 a small value in copper, zinc and silver, in addition to sand and gravel.

Mineral Production of British Columbia, 1916 and 1917.

Product.	1916.		1917.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Antimony and Molybdenite.....Lbs.		13,003	(b) 3,705	3,705
Copper (a)....."	63,642,550	17,312,046	57,730,959	15,691,275
Gold.....Ozs.	219,633	4,540,216	133,742	2,764,693
Lead.....Lbs.	39,157,701	3,333,496	29,483,725	3,283,602
Platinum.....Ozs.	15	600	57	3,823
Silver....."	3,392,872	2,227,794	2,655,994	2,162,430
Zinc.....Lbs.	21,701,560	2,778,667	27,861,441	2,479,947
Arsenic.....Tons.			280	11,200
Coal....."	2,584,061	8,075,190	2,433,888	8,235,716
Gypsum....."			10	20
Magnesite....."	635	9,525		
Magnesium sulphate....."			929	4,645
Mineral water....."		1,250		1,382
Pyrites.....Tons.	1,060	5,300	5,709	28,545
Quartz....."	41,077	82,154	37,755	132,143
Talc....."	53	848	25	400
Cement.....Bls.	285,679	436,459	207,587	438,009
Clay products....."		292,698		334,685
Lime.....Bus.	194,042	66,301	232,955	58,067
Stone....."		564,218		265,978
Other products....."		230,197		241,661
Total.....		39,969,962		36,141,926

(a) Smelter recoveries of copper.

(b) Molybdenite only.

Mineral Production of Yukon, 1916 and 1917.

Product.	1916.		1917.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Antimony ore.....Tons.	20	160		
Copper.....Lbs.	2,807,096	763,586	2,460,079	668,650
Gold.....Ozs.	212,700	4,396,900	177,667	3,672,703
Lead.....Lbs.	955,222	81,318	127,844	14,238
Silver.....Ozs.	360,101	236,446	119,605	97,379
Coal.....Tons.	3,800	13,200	4,872	29,232
Total.....		5,491,610		4,482,202

Mineral Production by Provinces, 1899-1917.

Calendar Year.	Nova Scotia*.	New Brunswick.	Quebec.	Ontario.	Manitoba.	Alberta.	Saskatchewan.	Yukon.	British Columbia.	Total.
1899.....	\$ 6,817,274	\$ 420,227	\$ 2,585,635	\$ 9,819,557	\$ 898,775	\$ 4,657,524	\$ 533,251	\$ 3,335,898	\$ 12,482,605	\$ 49,234,005
1900.....	9,298,479	430,060	3,292,383	11,268,099	584,374	5,122,505	413,212	3,669,290	16,680,526	64,420,877
1901.....	7,770,159	467,985	3,759,984	13,970,010	1,193,377	6,047,447	456,246	4,032,678	20,531,833	65,737,911
1902.....	10,686,549	607,129	3,743,636	14,619,091	1,500,359	8,996,210	498,122	4,764,474	17,448,031	63,231,836
1903.....	11,431,914	580,435	3,585,938	14,160,033	1,791,772	6,662,673	636,706	4,707,432	17,899,147	61,740,513
1904.....	11,212,746	559,913	3,688,482	12,582,843	2,463,074	12,073,589	1,165,642	5,933,242	19,325,174	60,082,771
1905.....	11,507,047	569,035	4,405,975	18,833,292	2,214,496	15,054,046	881,142	6,276,737	22,386,008	69,078,999
1906.....	12,894,303	646,328	5,242,058	25,111,682	2,628,284	16,527,535	860,651	4,482,202	25,239,600	79,286,697
1907.....	14,522,040	664,467	6,205,553	30,381,638	2,898,775	17,922,286	1,102,613	5,918,185	25,656,056	86,865,202
1908.....	14,487,108	579,816	6,372,949	30,623,812	584,374	15,122,505	413,212	3,669,290	23,704,035	85,557,101
1909.....	12,504,810	657,035	7,086,265	37,374,577	1,193,377	6,047,447	456,246	4,032,678	22,479,006	91,831,441
1910.....	14,195,730	581,942	8,270,136	43,538,078	1,500,359	8,996,210	498,122	4,764,474	24,478,572	106,823,623
1911.....	15,409,397	612,830	9,304,717	42,796,162	1,791,772	6,662,673	636,706	4,707,432	21,239,305	103,220,994
1912.....	18,922,236	771,004	11,656,908	51,985,876	2,463,074	12,073,589	1,165,642	5,933,242	30,076,635	135,048,290
1913.....	19,376,183	1,102,613	13,475,534	59,167,749	2,214,496	15,054,046	881,142	6,276,737	28,086,312	145,634,812
1914.....	17,584,639	1,014,570	11,836,929	53,034,677	2,413,489	12,634,234	712,313	5,418,185	24,164,039	128,863,075
1915.....	18,088,342	903,467	11,619,275	61,071,287	1,318,387	9,909,347	451,833	5,057,708	28,689,425	137,109,171
1916.....	20,042,262	1,118,187	14,406,598	80,461,323	1,823,576	13,297,543	590,473	5,491,610	39,969,962	177,201,534
1917.....	21,104,542	1,435,024	17,400,077	89,066,600	2,628,284	16,527,535	860,651	4,482,202	36,141,926	189,646,821

* Includes a small production from Prince Edward Island.

Mine Production.

The statistics of mineral production presented in the preceding tables are based as already explained in so far as metalliferous ores are concerned on the actual or probable recovery of refined metals from the ores treated. An endeavour has been made to compile another series of records eliminating as far as possible the metallurgical operations and to include only the actual quantities of ores, or concentrates shipped from mines and the net value of same. It has not been found feasible, however, to eliminate entirely the metallurgical operations in certain cases such as the recovery of bullion in placer operations, the recovery of gold bullion from milling ores and of silver bullion by those plants carrying on milling operations as well as mining, there being no commercial basis on which a separation of values could be made.

A record of mine production compiled on this basis is shown in the following tables and includes a record of the tonnage and value of ores, or minerals mined, treated and shipped, the quantities of metals contained in ores shipped and records of labour employed and wages paid. It should be noted that these records cover only active shipping mines and do not include any record of the labour employed in the smelting and refining of ores, nor in blast furnace operations, with the exceptions noted. Previous to 1917 no record was obtained of the labour employed in connexion with the production of petroleum, and similar returns in respect to placer mining were not sufficiently complete to be included in the tables. The values of the ores given are in general those furnished by the operators. In certain cases, however, where such values have not been furnished estimates have been made.

The tables showing the quantities of metals contained in the ores shipped give the total quantities of metals contained without any deductions, or allowances being made for smelter, or treatment losses.

Mine Production, 1914.

	No. of mines or works	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, con- centrates or minerals shipped.	Net value of ship- ments.
		Under- ground.	Surface.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Iron ores.....	5	598		364,489	345,410	244,854	542,041
Milling gold ore—							
Bullion shipped.....						13	6,101,463
Concentrates.....	44	1,070	1,206	2,603,414	754,732	6,974	860,379
Silver-cobalt ores—							
Mine bullion shipped.....						354	5,665,006
Ore and concentrate.....	29	1,412	1,883	3,207,116	733,174	16,917	7,827,140
Nickel-copper ores.....	9	736	1,286	1,693,997	1,000,364	999,908	5,020,003
Copper ores.....	4	113	180	177,721	119,292	117,762	502,637
Silver-lead and zinc ores.....	76	394	817	1,110,876	186,646	70,207	2,652,802
Zinc products.....						10,893	262,563
Gold-copper-silver ores.....	20	823	1,746	2,512,241	1,857,788	1,647,973	9,580,537
Placer mining—							
Yukon.....						10	5,132,616
British Columbia.....						1	565,000
Alberta.....							992
Total metalliferous.....	187	11,994		11,669,854	4,997,406	3,115,855	44,763,179
Total non-metalliferous.....	451	33,732		22,058,526	17,078,300	14,708,307	43,467,229
Total structural materials.....	1,023	21,129		9,881,316			26,009,227
	1,661	66,855		43,609,696			114,239,635

Mine Production 1914—Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.
	Ozs.	Ozs.	Lbs.	Lbs.	Lbs.	Lbs.
Milling gold ore—						
Bullion.....	289,860	85,110				
Concentrates.....	38,717	64,218		90	15,141	
Silver-cobalt ores—						
Mine bullion shipped.....		10,335,527				
Ore and concentrate.....		15,523,608				
Nickel-copper ores.....			60,800,799	36,300,532		
Copper ores.....	1,059	51,440		6,450,899		
Silver-lead, zinc-ores.....	334	2,501,820			50,527,130	
Zinc products.....		376,420				9,101,460
Gold-copper-silver ores.....	182,784	761,890		53,771,126		
Placer mining—						
Yukon.....	247,753	55,744				
British Columbia.....	27,332					
Alberta.....	48					
Total.....	787,887	29,755,777	60,800,799	96,522,647	50,542,271	9,101,460

Mine Production, 1915.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under-ground.	Surface.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Antimony ore.....	7	157		55,038	15,318	1,491	83,971
Molybdenite.....	4	52		16,990		37	28,450
Iron ores.....	5	399		230,346	251,742	398,112	774,427
Milling gold ore—							
Bullion shipped.....						18	8,953,130
Concentrates.....	50	1,324	1,555	2,893,487	1,180,477	8,335	711,947
Silver-cobalt ores—							
Mine bullion shipped.....						232	3,410,936
Ore and concentrate.....	25	1,008	1,531	2,363,414	588,404	61,362	8,326,776
Nickel-copper ores.....	5	857	1,745	2,202,536	1,364,048	1,372,724	10,552,673
Copper ores.....	6	173	205	215,065	141,758	142,121	1,026,562
Silver-lead and zinc ores.....	66	328	784	960,894	215,694	73,752	2,958,394
Zinc products.....						14,895	540,022
Gold-copper-silver ores.....	33	886	1,694	2,868,449	2,380,709	2,186,646	10,947,059
Placer mining—							
Yukon.....						9	4,776,145
British Columbia.....							770,000
Alberta.....							4,026
Total metalliferous.....	205	12,698		11,805,919	6,138,150	4,259,734	53,864,518
Total non-metalliferous.....	472	30,392		20,257,126	16,594,889	14,481,882	43,373,571
Total structural materials.....	943	13,786		5,657,717			17,920,759
	1,618	56,876		37,720,762			115,158,848

Mine Production, 1915—Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Antimony
	Ozs.	Ozs.	Tons.	Tons.	Tons.	Tons.	Tons.
Antimony ore.....							540
Milling gold ore—							
Bullion.....	430,981	87,116					
Concentrates.....	35,779	37,507					
Silver-cobalt ores—							
Mine bullion shipped.....		6,752,183					
Ore and concentrate.....		17,603,943					
Nickel-copper ores.....			43,891	23,318			
Copper ore.....	1,151	64,965		3,538			
Silver-lead-zinc ores.....	459	2,637,444			24,354		
Zinc products.....		316,731				6,116	
Gold-copper-silver ores.....	202,127	849,784		34,758			
Placer mining—							
Yukon.....	229,803	25,689					
British Columbia.....	37,249						
Alberta.....	195						
Total.....	937,744	28,375,362	43,891	61,614	24,354	6,116	540

Mine Production, 1916.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under- ground.	Sur- face.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Antimony ore.....	5	116		59,957	14,947 (a)	938	136,360
Molybdenite.....	9	262		122,072	13,522 (b)	78	156,461
Iron ores.....	4	530		376,716	331,822	275,176	715,107
Milling gold ore—							
Bullion shipped.....						21	10,418,052
Concentrates.....	49	1,304	1,709	3,540,899	1,502,336	9,840	522,409
Silver-cobalt ores—							
Mine bullion shipped.....						171	3,444,736
Ore and concentrate.....	32	1,034	1,561	2,450,614	547,882	77,453	9,736,490
Nickel-copper ores.....	6	875	1,837	2,824,818	1,566,333	1,566,333	11,766,201
Copper ores.....	12	232	261	293,115	170,666	155,999	1,444,676
Silver-lead ores.....	84	573	1,070	1,803,633	395,802	84,516	4,568,500
Zinc or s.....						82,077	1,086,249
Gold-copper-silver ores.....	59	1,259	1,975	4,395,924	2,907,344	2,431,930	18,514,772
Placer mining—							
Yukon.....							4,413,958
British Columbia.....						9	580,500
Alberta.....							1,695
Total metalliferous.....	260	14,598		15,867,748	7,450,654	4,684,041	67,536,166
Total non-metalliferous.....	532	30,541		24,987,562	18,170,207	15,699,830	53,414,983
Total structural materials.....	816	12,465		6,237,168			17,467,186
Total.....	1,608	57,604		47,092,478			138,418,335

(a) Includes refined antimony.

(b) MoS₂ contents of concentrates produced.

Mine Production, 1916—Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Antimony.
	Ozs.	Ozs.	Tons.	Tons.	Tons.	Tons.	Tons.
Antimony ore.....							429
Milling gold ore—							
Bullion.....	519,202	102,349					
Concentrates.....	30,138	54,136					
Silver-cobalt ores—							
Mine bullion shipped.....		4,932,702					
Ore and concentrate.....		15,690,716					
Nickel-copper ores.....			51,127	25,266			
Copper ores.....	713	65,438		4,638			
Silver-lead-zinc ores.....	784	2,582,952			27,062		
Zinc products.....		363,262				24,249	
Gold-copper-silver ores.....	163,466	905,685		42,126			
Placer mining—							
Yukon.....	211,010	47,703					
British Columbia.....	28,032						
Alberta.....	82						
Total	954,477	24,794,943	51,127	72,030	27,062	24,249	429

Mine Production, 1917.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Underground.	Surface.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Antimony ore.....	1	46		35,739	8,182	361	22,000
Molybdenite.....	22	379		260,692	26,871	1,554	320,006
Iron ores.....	9	528		509,163	305,330	215,302	758,621
Milling gold ore—							
Bullion shipped.....						18	9,312,424
Concentrates.....	45	1,388	1,633	3,687,392	1,303,410	8,874	365,375
Silver-cobalt ores—							
Mine bullion shipped.....						318	7,628,740
Ore and concentrates.....	32	1,079	1,369	2,667,607	527,850	72,719	10,123,838
Nickel-copper ores.....	6	907	1,737	2,981,896	1,518,783	1,509,841	11,323,808
Silver-lead ores.....	87	716	1,198	2,295,090	445,663	46,799	3,866,862
Zinc ores.....	83	1,730	2,253	4,667,578	2,554,738	116,489	1,323,985
Gold-copper-silver ores.....	83					1,878,911	16,048,186
Placer mining.....							
Yukon.....	69	890		1,337,063			3,310,268
British Columbia.....	34	275		208,589		8	496,000
Total metalliferous.....	388	16,128		18,650,809	6,690,827	3,851,194	64,900,113
Total non-metalliferous.....	763	32,088		31,398,570	18,438,815	15,468,048	63,354,363
Total structural materials.....	739	10,814		6,609,872			19,837,311
	1,890	59,032		56,659,251	25,129,642	19,319,242	148,091,787

Mine Production, 1917—Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Anti- mony.	Molyb- denite.
	Ozs.	Ozs.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Antimony ore.....							144	
Molybdenum ore.....								165
Milling gold ore—								
Bullion.....	447,373	77,250						
Concentrates.....	21,905	99,119						
Silver-cobalt ores—								
Mine bullion shipped.....		9,248,717						
Ore and concentrates.....		12,042,990						
Nickel-copper ores.....			52,587	24,521				
Gold-copper-silver ores...	77,599	782,521		40,479				
Silver-lead-zinc ores.....	1,033	1,670,064			19,348			
Zinc products.....		465,153				32,328		
Placer mining—								
Yukon.....	176,548	39,723						
British Columbia.....	23,994							
Total ..	748,452	24,425,537	52,587	65,000	19,348	32,328	144	165

Labour and Wages Statistics Covering Non-Metalliferous Mines during 1915, 1916, and 1917.

	1915.				1916.				1917.			
	Number Active Mines or Works.	Number Employed.	Wages Paid.	Number Active Mines or Works.	Number Employed.	Wages Paid.	Number Active Mines or Works.	Number Employed.	Number Active Mines or Works.	Number Employed.	Wages Paid.	Number Employed.
NON-METALLIC.												
Asbestos and asbestos.	9	2,394	\$ 1,091,076	13	2,821	\$ 1,659,913	15	3,114	15	3,114	\$ 2,312,110	3,114
Chromite.	6	204	116,339	12	229	109,146	9	253	9	253	211,105	253
Coal.	255	24,574	17,385,200	277	23,611	20,384,236	329	24,596	329	24,596	25,963,520	24,596
Feldspar.	6	87	21,173	7	119	42,980	8	101	8	101	53,742	101
Fluorspar.	5	110	40,643	3	36	8,449	7	59	7	59	28,810	59
Graphite.	4	110	18,996	6	344	191,876	6	282	6	282	191,307	282
Grindstones, pulpstones and scythestones.	4	110	18,996	5	128	24,330	5	92	5	92	25,052	92
Gypsum.	16	1,152	468,612	15	919	467,262	12	774	12	774	445,128	774
Magnesite.	4	110	23,607	3	183	144,987	2	296	2	296	194,864	296
Mica and phosphate.	23	138	47,372	33	241	86,101	28	283	28	283	119,440	283
Mineral pigments: barytes, and ochres.	4	61	24,197	4	125	42,169	7	109	7	109	56,185	109
Mineral water.	17	50	23,066	20	60	30,307	22	53	22	53	22,246	53
Natural gas.	88	619	511,967	94	750	532,913	105	597	105	597	520,290	597
Peat.	1	18	3,200	(c)	(b)	.....	.....	.....	.....	.....	.....	.....
Petroleum.	(c)	.....	.....	(d)	.....	.....	.....	.....	.....	.....	.....	.....
Pyrites.	7	207	172,986	11	375	310,656	11	454	11	454	167,205	454
Quartz.	6	122	78,747	8	167	164,763	12	289	12	289	287,817	289
Salt.	11	254	186,059	9	262	219,595	10	309	10	309	249,073	309
All others†	10	182	43,886	12	171	67,879	8	157	8	157	96,736	157
Total non-metallic.	472	30,392	20,257,126	532	30,541	24,987,562	763	32,088	763	32,088	31,398,570	32,088
STRUCTURAL.												
Cement.	20	1,686	1,184,459	15	1,635	1,307,224	9	1,396	9	1,396	1,424,215	1,396
Clay products.	349	4,405	1,452,828	290	4,164	1,740,900	276	3,915	276	3,915	2,174,167	3,915
Lime.	78	633	293,735	76	758	381,368	67	770	67	770	554,617	770
Sand-lime brick.	18	177	41,043	15	139	50,079	13	150	13	150	65,175	150
Sand and gravel.	241	1,721	491,830	221	1,667	631,195	208	1,562	208	1,562	770,167	1,562
Slate.	1	20	5,520	1	22	11,085	1	19	1	19	10,933	19
Stone.	236	5,144	2,198,802	198	4,020	2,115,320	165	3,002	165	3,002	1,610,598	3,002
Total structural.	943	13,786	5,657,717	816	12,465	6,237,103	739	10,814	739	10,814	6,609,872	10,814
Total non-metalliferous.	1,415	44,178	25,874,670	1,348	43,006	31,224,730	1,502	42,902	1,502	42,902	38,008,442	42,902

†Includes in 1915—actinolite, corundum, manganese, talc, and tripolite.

" 1916—actinolite, corundum, manganese, peat, tripolite and talc.

" 1917—corundum, manganese, magnesium sulphate, tripolite and talc.

(a) Estimated for 1915. (b) Included in "All other." (c) Not collected. (d) Partial.

ALUMINIUM.

No commercial ores of aluminium have as yet been found in Canada. Aluminium is, however, made in extensive works at Shawinigan Falls, Quebec, from bauxite ores imported from France, the United States, and also formerly from Germany, by the Northern Aluminium Company. A wire mill for the manufacture of aluminium wire and cables is also operated by the same firm.

There being but one firm engaged in the manufacture of aluminium we are precluded from publishing statistics of production.

Imports of alumina, probably including bauxite, and exports of aluminium are, however, published in the reports of the Department of Customs.

During the twelve months ending December 31, 1917, the imports of alumina were 174,307,800 pounds, or 87,154 tons valued at \$1,866,240, as against 53,819,000 pounds, or 26,910 tons valued at \$1,114,061 in 1916.

The imports of aluminium in ingots, bars, tubes, etc., were in 1917, 702,952 pounds, or 351.5 tons, valued at \$319,680, besides manufactures of aluminium valued at \$240,801 or a total value of \$560,481, compared with 1,355,503 pounds, or 678 tons, valued at \$526,646, besides manufactures of aluminium valued at \$144,452, or a total of \$671,098 in 1916.

The exports of aluminium in ingots, bars, tubes, etc., in 1917, amounted to 22,324,600 pounds or 11,162 tons valued at \$7,620,953, together with manufactures of aluminium valued at \$17,165, as against 18,425,300 pounds, or 9,213 tons valued at \$5,201,066, and manufactures valued at \$26,780 in 1916.

Annual Imports of "Alumina" and Exports of Aluminium.

Calendar Year.	Imports of Alumina.		Exports of Aluminium.		
			Ingots, Bars, etc.		Manufactures.
	Pounds.	Value.	Pounds.	Value.	Value.
1905.....	5,360,800	\$ 138,735	2,535,386	\$ 508,219	\$ 1,538
1906.....	8,975,400	239,136	4,521,486	899,113	2,244
1907.....	12,705,300	268,502	5,478,203	1,109,353	1,499
1908.....	1,485,500	29,752	1,713,800	399,785	1,727
1909.....	11,794,100	234,544	6,134,500	918,195	3,453
1910.....	19,464,400	403,283	7,722,400	1,160,242	3,741
1911.....	18,607,200	372,009	4,990,100	747,557	1,555
1912.....	22,400,500	448,061	18,285,700	2,002,363	10,898
1913.....	30,704,200	614,713	13,015,000	1,762,214	8,203
1914.....	28,557,000	571,419	14,510,800	2,364,907	5,571
1915.....	35,016,200	892,634	18,680,800	3,333,726	620,562
1916.....	53,819,000	1,114,061	18,425,300	5,201,066	26,780
1917.....	174,307,800	1,866,240	22,324,600	7,620,953	17,165

Annual Imports of Aluminium.

Year.	Ingots, Blooms, Bars.		Tubing.		Manufactures.	Leaf or foil (a).	Total value.
	Pounds.	Value.	Pounds.	Value.			
1910.....	3,180,250	\$ 674,683	10,019	\$ 4,203	\$ 77,664	.....	\$ 756,550
1911.....	2,527,120	531,273	3,594	1,495	115,278	.....	648,046
1912.....	2,396,375	410,022	11,624	3,654	120,029	.....	533,705
1913.....	3,455,686	604,582	19,856	9,174	131,938	.....	745,694
1914.....	3,796,353	745,855	15,775	6,898	103,143	\$ 4,455	860,351
1915.....	2,661,117	630,504	6,238	2,998	83,281	5,452	722,235
1916.....	1,350,485	523,564	5,018	3,082	95,408	49,044	671,098
1917.....	698,046	316,591	4,906	3,089	137,636	103,165	560,481

(a) Not given separately, previous to 1914.

Prices.—The price of aluminium ingot No. 1 grade was around 37 cents per pound in the first quarter and around 38 cents for the balance of the year. Spot sales by scrap dealers, or re-sales in small quantities were generally made at a price ranging from 55 to 60 cents per pound. In March 1918, the War Industries Board of the United States of America fixed the price at a maximum base price of 32 cents per pound.

Average Monthly Prices of Ingot Aluminium. ¹

(At New York in cents per pound.)

—	1912.	1913.	1914.	1915.	1916.	1917.
January.....	19.13	26.31	18.81	19.08	55.00	60.77
February.....	19.44	26.04	18.81	19.22	58.00	59.00
March.....	19.58	27.05	18.50	19.00	60.25	59.00
April.....	20.38	27.03	18.16	18.88	59.50	59.92
May.....	21.69	26.44	17.95	22.03	59.00	59.84
June.....	22.83	24.68	17.75	30.00	61.50	60.00
July.....	23.50	23.38	17.66	32.38	60.20	55.48
August.....	24.38	22.70	19.88	34.50	60.00	48.88
September.....	25.13	21.69	19.94	47.75	61.88	43.64
October.....	26.25	20.13	18.50	50.00	65.05	38.90
November.....	26.56	19.35	18.00	57.75	65.12	37.22
December.....	25.75	18.88	18.96	57.13	63.00	36.40
	22.01	23.64	18.63	33.98	60.71	51.59

These quotations of prices reflect transactions in the market for uncontracted supplies, which is mainly in metal offered for re-sale, including ingots remelted for scrap. The bulk of the aluminium production enters consumption on long terms contracts. Previous to the war the differences between the contractual and the open markets were not very great, but since the beginning of the war they have been very large.

¹ From the *Engineering and Mining Journal*, January 12, 1918.

ANTIMONY.

Shipments of both antimony ore and concentrates and of refined antimony were made from Canadian properties intermittently during the last ten years. Refined antimony has been produced at the smelter of the Consolidated Mining and Smelting Company at Trail, B.C., recovered from the residues of the lead refinery; and at the works, at Lake George, New Brunswick, of the New Brunswick Metals, Limited, the latter property having been formerly operated by the Canadian Antimony Company.

The shipments of antimony ore and concentrates in 1917, were reported as 361 tons valued at \$22,000, as against 885 tons valued at \$94,537; in 1917—no production of refined antimony was reported.

The exports of antimony ore in 1917 amounted to 774 tons valued at \$50,476, as against 794 tons valued at \$48,158 in 1916.

The imports of antimony were 344,429 pounds valued at \$68,027 as against 838,713 pounds valued at \$222,341 in 1916.

Annual Shipments of Antimony Ore.

Calendar Year.	Antimony ore.		Refined regulus.	
	Tons.	Value.	Pounds.	Value
1886.....	665	\$ 31,490		
1887.....	584	10,860		
1888.....	345	3,696		
1889.....	55	1,100		
1890.....	26½	625		
1891.....	10	60		
1892 to 1897.....				
1898.....	1,344	20,000		
1899 to 1904.....				
1905 (a).....	527			
1906 (a).....	782			
1907.....	2,016	65,000	63,850	\$ 5,108
1908 (b).....	148	5,443		
1909.....	35	1,575	61,207	4,285
1910.....	364	13,906		
1911-1914.....				
1915.....	1,341	81,283	59,440	11,888
1916.....	885	94,537	107,185	41,823
1917.....	361	22,000		

(a) As recorded by the Nova Scotia Department of Mines; no value given.

(b) Exports.

Exports and Imports of Antimony.

Calendar Year.	Exports of antimony ore.		Imports					
			Antimony or regulus of.		Antimony salts.		Total imports.	
	Tons.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1907.....	1,327	\$ 37,807	416,512	\$ 69,447	117,592	\$ 19,083	534,104	\$ 88,530
1908.....	148	5,443	396,904	28,509	29,832	2,452	426,736	30,961
1909.....	4	120	551,354	37,362	40,176	4,369	591,530	41,731
1910.....	239	14,095	388,952	25,296	94,330	9,152	483,282	34,448
1911.....	57	4,946	561,046	36,405	18,420	2,418	579,466	38,823
1912.....			998,045	60,456	55,683	7,197	1,053,728	67,653
1913.....			667,050	49,408	23,649	2,421	690,699	51,829
1914.....			648,516	47,498	45,634	10,217	694,150	57,715
1915.....	1,149	82,990	1,962,194	344,918	67,956	10,320	2,030,150	355,238
1916.....	794	48,158	796,728	208,450	41,985	13,891	838,713	222,341
1917.....	774	50,476	332,137	61,732	12,292	6,295	344,429	68,027

Prices.—Early in 1917 the price slowly advanced, reaching a maximum of 36 cents per pound on March 29th, then it receded gradually to a minimum of 13½ cents on November 13th.

The collapse of Russia as a fighting force was a great factor in reducing the price by cutting down the production of shrapnel bullets, which were in much demand on the Russian front.

In 1916, Canada, as reported by the "Engineering and Mining Journal", used a large quantity of antimony but there had been no demand from Canada for some time. Indeed during the last few months antimony bought by Canadian munition makers for their own requirements was found to be unnecessary, and some of it crossed into the United States.

Average Prices of Antimony.*

(In cents per pound.)

	1914.			1915.		1916.	1917.
	Cookson's.	U.S. ¹	Ordin-aries. ²	Cookson's.	Ordin-aries. ²	Ordin-aries. ²	Ordin-aries. ²
January	7.388	7.110	6.125	17.90	15.85	42.45	17.29
February	7.250	7.057	6.100	21.25	18.21	44.31	29.80
March	7.315	7.073	6.053	28.75	22.13	44.75	32.89
April	7.363	7.048	6.006	31.88	24.88	42.06	34.04
May	7.365	7.020	6.845	42.70	35.30	31.60	25.20
June	7.250	7.000	5.825	47.50	37.69	20.05	19.51
July	7.210	6.940	5.638	50.44	38.13	14.70	15.83
August	17.250	15.800	13.800	48.00	33.00	11.53	15.06
September	11.830	.....	9.940	44.56	28.63	11.81	14.94
October	14.680	.....	12.060	45.50	31.45	12.70	14.75
November	17.750	.....	14.450	47.25	38.88	13.84	13.91
December	16.130	.....	13.310	55.00	39.25	14.59	15.06
	10.732	.....	8.763	40.06	30.28	25.37	20.69

¹ United States brands.

² Hungarian, Chinese, or other "Foreign" brands.

*As given by the "Engineering and Mining Journal."

Antimony is reported¹ smelted in the United States by the following firms:—

Magnolia Metal Co., 115 Bank St., New York City, Smelter at Matawan, N.J.

The Pennsylvania Smelting Co., Pittsburg, Pa.

Great Western Smelting and Refining Co., Chicago, Ill.

Western Metals Co., 625 Security Bldg., Los Angeles, California.

Chapman Smelting Co., 409 Battery St., San Francisco, California.

International Smelting Co., Wm. Wrait, Mgr., Salt Lake City, Utah.

Besides these the American Star Antimony Co. is extracting antimony electrically, at Gilham, Ark.; the Hoyt Metal Co., St. Louis, Mo., smelts more or less antimony ores in conjunction with lead ores to make antimony lead; and the John Finn Metal Works, San Francisco, Cal., has also treated some antimony ores.

¹ From the "Mining Congress Journal," January, 1917.

COBALT.

The silver-cobalt-nickel arsenides of Coleman and adjacent townships, more familiarly known as the Cobalt district, in the Province of Ontario, are now the principal sources of the world's supply of cobalt.

The recovery of this metal in Canada had been in the form of cobalt oxide and mixed oxides of cobalt and nickel, produced by the smelters treating the above ores, together with cobalt residues produced at the high grade mill of the Nipissing Mining Company. Formerly these residues have been chiefly exported, but they are now being shipped mainly to Canadian smelters.

In addition to the oxide of cobalt, there is now being recovered metallic cobalt, cobalt sulphate, cobalt carbonate, cobalt hydroxide, unseparated oxides, and stellite (the cobalt alloy used for high speed tool metal).

The total production of cobalt contained in smelter products recovered and in cobalt residues exported during 1917, amounted to 1,079,572 pounds, which if valued at \$1.60 per pound, would be worth \$1,727,315, as against 840,536 pounds, which at \$1.10 per pound, were valued at \$924,590.

This production included in 1917, 393,773 pounds of metallic cobalt valued by the producers at \$616,633; 802,448 pounds of cobalt oxide valued at \$1,104,500; together with other cobalt compounds, such as stellite and cobalt sulphate, amounting to 214,785 pounds valued at \$740,032, making a total valuation of \$2,461,165.

The 1916 production included 215,215 pounds of metallic cobalt valued at \$200,888; 670,760 pounds of cobalt oxide valued at \$542,341; together with smaller quantities of cobalt sulphate, cobalt carbonate, cobalt hydroxide, unseparable oxides, stellite and cobalt residues.

Some of the cobalt residues from the Nipissing mill were shipped to smelter works in Great Britain in 1916 and in 1917.

The total cobalt ores and residues treated in 1917 amounted to 7,770 tons with a cobalt content of 866,327 pounds, as against 8,127 tons with a cobalt content of 1,254,953 pounds in 1916.

Production of Cobalt and Cobalt-Oxides.

Year.	Metallic cobalt.		Cobalt-oxide.		Mixed oxides of cobalt and nickel and other cobalt material.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1912			257,677	\$ 128,843	1,285,280	\$ 163,988
1913			660,079	525,028	3,216,000	90,266
1914			899,027	571,710	2,079,001	79,995
1915	211,610	\$ 197,994	423,717	338,273	(a).....	(a).....
1916	215,215	200,888	670,760	542,341	(a).....	(a).....
1917	393,773	616,633	802,448	1,104,500	.....	740,032

(a) Value not given in 1915 and 1916.

Prior to the war the principal demand for cobalt was for colouring in the ceramic industry. A small demand for cobalt metal now exists for use in making high speed tools, such as "stellite", an alloy of cobalt, chrome, and tungsten, or molybdenum. A small amount is used for plating and for making salts, such as cobalt sulphate and cobalt carbonate, and also for making cobalt hydroxide.

Prices.—The market for cobalt was very poor in 1915, but improved somewhat in 1916 and 1917. The price of cobalt as quoted in New York in 1916, ranged from \$1.25 to \$1.50 per pound. In 1917 the price of cobalt was around \$1.70 per pound.

Under the provision of the "Metal Refining Bounty Act", passed by the Ontario Legislature, in 1907, bounties amounting to \$26,774.75 were paid to refineries on cobalt oxide, and \$10,280.28 on nickel oxide in 1914, while in 1915, \$19,029.22 were paid on cobalt metal and cobalt oxide and \$6,521.69 on nickel metal and nickel oxide; and in 1916 the bounties were \$29,999.84 on cobalt metal, cobalt oxide and salts of cobalt, and \$8,558.52 on nickel metal, nickel oxide and nickel sulphate.

The bounty was at the rate of six cents per pound on the metallic contents of the oxides. The "Act", which expired in April 1917 and was not re-enacted, was quoted in the Annual Report on Mineral Production of Canada during the Calendar Year 1914, and previous reports of this Division.

The results of researches on cobalt and cobalt alloys, undertaken for the Mines Branch, by Dr. H. T. Kalmus, at Queen's University, have been published in five parts.¹

¹ Mines Branch No. 259, "Preparation of Metallic Cobalt by Reduction of the Oxide." Report on, by H. T. Kalmus, B.Sc., Ph.D.

Mines Branch No. 309, "The Physical Properties of the Metal Cobalt." Report on, by H. T. Kalmus, B.Sc., Ph.D.

Mines Branch No. 334, "Electro-plating with Cobalt." Report on, by H. T. Kalmus, B.Sc., Ph.D., 1915.

Mines Branch No. 411, "Cobalt Alloys with Non-Corrosive Properties." Report on, by H. T. Kalmus, B.Sc., Ph.D.

Mines Branch No. 413 "Magnetic Properties of Cobalt and of Fe₂Co." Report on, by H. T. Kalmus, B.Sc., Ph.D.

COPPER.

The total production of copper in 1917, estimated on the basis of smelter recovery from ores treated, was 109,227,332 pounds, which at the average price of copper for the year in New York, 27.180 cents per pound, would be worth \$29,687,989, as against 117,150,028 pounds valued at \$31,867,150 in 1916, that is a decrease of 6.7 per cent in quantity and 6.5 per cent in value, but the production remains higher than that of any other preceding year with the exception of 1916.

Annual Production of Copper.

Calendar year.	Pounds.	Value.	Cents per pound.	Calendar year.	Pounds.	Value.	Cents per pound.
1886.....	3,505,000	\$ 385,550	11.00	1902.....	38,804,259	\$4,511,383	11.626
1887.....	3,260,424	366,798	11.25	1903.....	42,684,454	5,649,487	13.235
1888.....	5,562,864	927,107	16.66	1904.....	41,383,722	5,306,635	12.823
1889.....	6,809,752	936,341	13.75	1905.....	48,092,753	7,497,660	15.590
1890.....	6,013,671	947,153	15.75	1906.....	55,609,888	10,720,474	19.278
1891.....	9,529,401	1,226,703	12.87	1907.....	56,979,205	11,398,120	20.004
1892.....	7,087,275	818,580	11.55	1908.....	63,702,873	8,413,876	13.208
1893.....	8,109,856	871,809	10.75	1909*	52,493,863	6,814,754	12.982
1894.....	7,708,789	736,960	9.56	1910.....	55,692,369	7,094,094	12.738
1895.....	7,771,639	836,228	10.76	1911.....	55,648,011	6,886,998	12.376
1896.....	9,393,012	1,021,960	10.88	1912.....	77,832,127	12,718,548	16.341
1897.....	13,300,802	1,501,660	11.29	1913.....	76,976,925	11,753,606	15.269
1898.....	17,747,136	2,134,980	12.03	1914.....	75,735,960	10,301,606	13.602
1899.....	15,078,475	2,655,319	17.61	1915.....	100,785,150	17,410,635	17.275
1900.....	18,937,138	3,065,922	16.19	1916.....	117,150,028	31,867,150	27.202
1901.....	37,827,019	6,096,581	16.117	1917....	109,227,332	29,687,989	27.180

*The decrease is not as large as the figures would indicate because of the calculation of part of the 1909 production on a different basis from previous years.

The production in 1917 included 30,425 pounds recovered in copper sulphate; 43,964,733 pounds contained in blister copper partly exported for refining, and partly refined at Trail, B.C.; 42,392,588 pounds contained in nickel-copper matte exported for refining; and 22,839,586 pounds in ore and concentrates, after allowing for smelter losses, exported for smelting and refining (including a small amount of copper matte from Ladysmith).

The production of copper in 1916 included 32,611 pounds recovered in copper sulphate; 43,615,868 pounds contained in blister copper exported for refining; 49,115,124 pounds contained in matte, chiefly nickel-copper matte exported for refining (including small amount of copper refined at Trail); and 24,386,425 pounds in ore, after allowing for smelter losses, exported for smelting and refining.

The production by provinces was as follows: British Columbia contributed 52.8 per cent of the total, as against 54.3 per cent in 1916; Ontario 39.2 per cent, as against 38.4 per cent in 1916; Quebec 4.6 per cent as against 4.9 per cent in 1916; the Yukon territory 2.2 per cent as against 2.4 per cent in 1916; and the balance 1.2 per cent was contributed by Manitoba, Alberta, and New Brunswick.

Production of Copper by Provinces, 1915, 1916, and 1917.

Province.	1915.		1916.		1917.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Quebec.....	4,197,482	\$ 725,115	5,703,347	\$ 1,551,424	5,015,560	\$ 1,363,229
Ontario.....	39,361,464	6,799,693	44,997,035	12,240,094	42,867,774	11,651,461
British Columbia.....	56,692,988	9,793,714	63,642,550	17,312,046	57,730,959	15,691,275
Yukon.....	533,216	92,113	2,807,096	763,586	2,460,079	668,650
Others (a).....					1,152,960	313,374
Total.....	100,785,150	17,410,635	117,150,028	31,867,150	109,227,332	29,687,989

(a) Includes Manitoba, Alberta, and New Brunswick.

Prices.—The price of copper which had been on the decline in the latter part of 1916 was down to 28½ cents early in January, 1917, declining further to 26½ cents by January 10th, then rallied up to 30½ cents by January 15th. During February and March the prices varied from 32 to 34 cents. On March 31st, the U.S. Government contracted for 45,000,000 pounds at 16½ cents deliveries extending over 12 months from April 1st. The price remained fairly well around 30 cents per pound until late in June when the U.S. Government was reported to have contracted for 60,000,000 pounds at 25 cents delivery extending over the ensuing 12 months. In fact the Government agreed to advance to the copper producers 22½ cents leaving the difference between that price and 25 cents to be settled after the receipt of the report of the Federal Trade Commission. On September 6th. the War Industries Board bought about 77,000,000 pounds for the Allies at 25 cents, and on September 21st., the U.S. Government fixed the price at 23½ cents f. o. b. New York for four months from that date.

Monthly Average Prices of Electrolytic Copper in New York.

(In cents per pound.)

Months.	1912.	1913.	1914.	1915.	1916.	1917.
January.....	14 094	16 488	14 223	13 641	24 008	28 673
February.....	14 084	14 971	14 491	14 394	26 440	31 750
March.....	14 693	14 713	14 131	14 787	26 310	31 481
April.....	15 741	15 291	14 211	16 811	27 895	27 935
May.....	16 031	15 436	13 996	18 506	28 625	28 788
June.....	17 234	14 672	13 603	19 477	26 601	29 962
July.....	17 190	14 190	13 223	18 796	23 865	26 620
August.....	17 498	15 400	*	16 941	26 120	25 380
September.....	17 508	16 328	*	17 502	26 855	25 073
October.....	17 314	16 337	*	17 686	27 193	23 500
November.....	17 326	15 182	11 739	18 627	30 625	23 500
December.....	17 376	14 224	12 801	20 133	31 890	23 500
Yearly average.....	16 341	15 269	13 602	17 275	27 202	27 180

*No quotations.

Monthly Average Prices of Standard Copper in London.

(In £ Sterling per ton of 2,240 pounds.)

Months.	1912.	1913.	1914.	1915.	1916.	1917.
January.....	62·760	71·741	64·304	60·756	88·083	131·821
February.....	62·893	65·519	65·259	63·494	102·667	137·895
March.....	65·884	65·329	64·276	66·152	107·714	136·750
April.....	70·294	68·111	64·747	75·096	124·319	133·842
May.....	72·352	68·807	63·182	77·600	135·457	130·000
June.....	78·259	67·140	61·335	82·574	112·432	130·000
July.....	76·636	64·166	60·540	76·011	95·119	128·409
August.....	78·670	69·200	*	68·673	110·283	122·391
September.....	78·762	73·125	*	68·915	113·905	117·500
October.....	76·289	73·383	*	72·601	122·750	110·000
November.....	76·890	68·275	53·227	77·744	134·659	110·000
December.....	75·516	65·223	56·841	80·773	145·316	110·000
Yearly average.....	72·942	68·335	61·524	72·532	116·059	124·892

*No quotations.

Exports and Imports.—With the exception of a small output of copper sulphate and 3,901 tons of refined copper produced at Trail, B.C., the copper production of Canada is exported for refining.

The exports of copper in ore, matte, regulus, etc., during the calendar year 1917, were 86,556,900 pounds valued at \$14,183,264 as against 124,942,400 pounds valued at \$20,776,536 in 1916. The exports of copper, black, or coarse and in pigs, etc., were 17,570,600 pounds valued at \$4,776,025 as against 2,430,400 pounds valued at \$581,268 in 1916. The exports of "old and scrap" copper amounted to 15,793,900 pounds valued at \$4,296,989, as against 5,846,600 pounds valued at \$1,284,895.

The total exports of copper in 1917 were 119,921,400 pounds valued at \$23,256,278 as against 133,219,400 pounds valued at \$22,642,699 in 1916.

Exports of Copper, 1910 to 1917.

Year.	Fine in ore, matte, regulus, etc.		Black or coarse and in pigs, bars, sheets, etc.		Old and Sc ap.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1910.	56,964,127	\$ 5,840,553	.....	.....	.....	.....	56,964,127	\$ 5,840,553
1911.	55,208,054	5,459,770	79,656	\$ 7,955	.....	.....	55,287,710	5,467,725
1912.	76,542,643	8,800,267	1,945,921	236,212	.....	.....	78,488,564	9,036,479
1913.	81,879,080	9,479,480	771,280	123,131	24,972	\$ 324,903	85,147,560	9,927,814
1914.	68,830,059	7,130,778	6,581,564	908,201	1,987,100	231,710	77,398,723	8,270,689
1915.	81,437,063	8,671,641	21,292,516	3,788,715	4,161,600	613,553	106,891,179	13,076,909
1916.	124,942,400	20,776,536	2,430,400	51,268	5,846,600	1,284,895	133,219,400	22,642,699
1917.	86,556,900	14,183,264	17,570,600	4,776,025	15,793,900	4,296,989	119,921,400	23,256,278

The total recorded imports of copper during the calendar year 1917 were valued at \$10,015,561 and included: crude and manufactured copper, 29,942,394 pounds, valued at \$9,384,586; copper sulphate 3,155,924 pounds valued at \$314,785; and the manufactures of copper valued at \$316,190. In 1916 the total imports were valued at \$7,566,080 and included: crude and manufactured copper 25,594,029 pounds valued at \$7,133,117; copper sulphate 1,803,655 valued at \$198,542; and the manufactures of copper valued at \$234,421.

Unfortunately the above record does not represent the total copper imports during 1916 and 1917 because of the fact that large quantities of copper, imported for the use of the Imperial Government have been, for Customs Records purposes, entered with many other products under one item.

There are also imports of copper in the form of brass. The recorded imports of brass in 1917 included 3,962,957 pounds of metal in crude and manufactured form (see chapter on zinc), valued at \$1,277,249, and containing possibly 2,774,070 pounds of copper; and also manufactures of brass, quantity not recorded, valued at \$4,051,410; while in 1916 the imports of brass included 2,974,676 pounds of metal in crude and manufactured form, valued at \$923,523, and containing probably 2,082,273 pounds of copper; and also manufactures of brass, quantity not recorded, valued at \$3,752,851.

Imports of Copper, 1916 and 1917.

	1916.		1917.	
	Pounds.	Value.	Pounds.	Value.
Copper, old scrap	96,700	\$ 20,777	116,900	\$ 28,867
Copper in pigs, ingots or in blocks	3,446,300	904,505	5,917,500	1,771,901
Copper in bars, and rods, in coils, or otherwise, in lengths, not less than 6 feet, unmanufactured ..	18,460,600	5,062,854	29,714,700	6,277,115
Copper, in strips, sheets or plates, not planished or coated, etc.	2,650,700	792,400	2,026,500	778,558
Copper tubing in lengths not less than 6 feet and not polished, bent or otherwise manufactured	873,944	335,339	1,063,306	487,260
Copper rollers, for use in calico printing		727		
Copper and manufactures of :—				
Nails, tacks, rivets and burrs or washers.		3,593		15,277
Wire, plain, tinned or plated	55,843	16,523	81,588	39,133
Wire cloth, etc.		2,926		5,308
All other manufactures of, n.o.p.		227,175		295,605
Copper, precipitate of, crude	9,942	719	21,900	1,752
Copper sulphate (blue vitriol)	1,803,655	198,542	3,155,924	314,785
Total value		7,566,080		10,015,561

Imports of Copper, 1907 to 1917, inclusive.

Year.	Pigs, ingots or in blocks.		Old and Scrap.		Manufactures of Copper.			Crude Precipitate.		Copper Sulphate.		Total.
	Pounds.	Value.	Pounds.	Value.	Bars, Rods, Sheets, Tube and Wire.		Other Manufactures.	Pounds.	Value.	Pounds.	Value.	
					Pounds.	Value.						
1907....	3,456,900	\$ 699,388	196,300	\$ 37,787	13,499,130	\$ 3,138,283	\$ 108,057	7,397	\$ 1,340	2,299,674	\$ 142,948	\$ 4,127,803
1908....	2,360,900	353,301	127,700	12,821	12,150,850	1,765,415	88,715	4,209	557	2,768,123	131,057	2,351,866
1909....	4,200,100	554,273	132,600	14,447	16,208,978	2,340,464	126,769	1,990	257	1,634,751	66,459	3,102,669
1910....	4,640,500	669,111	273,700	31,070	25,322,906	3,579,270	150,322	4,847	595	1,925,557	77,782	4,448,150
1911....	5,650,400	705,598	265,300	28,748	29,244,210	3,898,416	215,289	2,608	299	2,191,899	88,419	4,936,769
1912....	5,121,800	806,705	400,500	56,748	35,198,208	5,776,003	305,680	5,703	570	2,105,419	101,650	7,047,356
1913....	5,314,200	845,095	596,700	87,790	35,101,061	6,002,937	370,313	4,743	515	2,037,714	107,960	7,414,610
1914....	3,733,300	507,499	127,800	15,717	22,419,715	3,460,106	219,449	2,017	328	1,143,039	53,802	4,256,901
1915....	4,771,200	777,533	68,500	8,281	15,405,520	2,807,969	264,670	187	35	1,854,850	99,282	3,957,770
1916....	3,446,300	904,505	96,700	20,777	22,041,087	6,207,116	234,421	9,942	719	1,803,655	198,542	7,566,080
1917....	5,917,500	1,771,901	116,900	28,897	23,886,094	7,582,066	316,190	21,900	1,572	3,155,924	314,785	10,105,561

Consumption.—In view of the large import of manufactured copper and brass for which no quantity is recorded, it is difficult to estimate closely the consumption of copper. The imports in 1916 amounted to at least 51,000,000 pounds on the basis of the United States record, and allowing 5,000,000 pounds for metal contained in other manufactures of copper and brass. Domestic production was practically all exported together with 6,000,000 pounds of copper "old and scrap," which, if deducted from the imports, gives an estimated consumption of 45,000,000 pounds, or 22,500 tons.

In 1917 the United States trade records report 49,871,919 pounds of refined copper in ingots, bars, etc., as being exported to Canada. If we allow about 10,000,000 pounds for copper in unrefined block, blister and converter copper, and in manufactures of copper and brass, we get a total of about 59,871,919 pounds, or 29,936 tons. Domestic production amounted to 54,614 tons and the exports were 59,961 tons, giving a difference of 5,347 tons, which, if deducted from the imports gives an estimated consumption of 24,589 tons. But information from other sources would bring the consumption to 39,000 tons in 1917.

Quebec.

The production of copper in Quebec in 1917 was derived mostly, as in the past, from the Eustis and Weedon mines in the Eastern Townships and amounted to 5,015,560 pounds valued at \$1,363,229, representing the estimated recovery from 122,882 tons of ore and concentrates with a metal content of 7,440,711 pounds of copper, as against 5,703,347 pounds valued at \$1,551,424 representing the estimated recovery from 130,492 tons of ore and concentrates with a metal content of 8,215,085 pounds of copper in 1916.

Quebec: Production of Copper.

Year.	Pounds.	Value.	Year.	Pounds.	Value.	Year.	Pounds.	Value.
1886.....	3,340,000	\$ 367,400	1897.....	2,474,970	\$ 279,424	1908.....	1,282,024	\$ 169,330
1887.....	2,937,900	330,514	1898.....	2,100,235	252,658	1909.....	1,088,212	141,272
1888.....	5,562,864	927,107	1899.....	1,632,560	287,494	1910.....	877,347	111,757
1889.....	5,315,000	730,813	1900.....	2,220,000	359,418	1911.....	2,436,190	301,503
1890.....	4,710,606	741,920	1901.....	1,527,442	246,178	1912.....	3,282,210	536,346
1891.....	5,401,704	695,469	1902.....	1,640,000	190,666	1913.....	3,455,887	527,679
1892.....	4,883,480	564,042	1903.....	1,152,000	152,467	1914.....	4,201,497	571,488
1893.....	4,468,352	430,348	1904.....	760,000	97,455	1915.....	4,197,482	725,115
1894.....	2,176,430	208,067	1905.....	1,621,243	252,752	1916.....	5,703,347	1,551,424
1895.....	2,242,462	241,288	1906.....	1,981,169	381,930	1917.....	5,015,560	1,363,229
1896.....	2,407,200	261,903	1907.....	1,517,990	303,659	Total ...	83,613,363	14,352,115

Ontario.

The copper production of Ontario comes mainly from the nickel-copper ores of Sudbury district. The chief companies are:—

The Canadian Copper Co., Ltd., shipping from the Creighton and adjoining properties.

The Mond Nickel Co., Ltd., operating at Coniston.

The Alexo Mining Co., operating near Porquis Junction, and shipping to the Coniston smelter.

The British American Nickel Corporation, which carried on active development and construction work but did not ship during 1917.

A few small shipments were also made from the following:—

- The Bruce Mine, near Bruce Mines, Algoma.
- The Cheney Mine, near Thessalon, Algoma.
- The Hudson Copper Co., Ltd., near Havilah, Algoma.
- The Kenyon Copper Mines, Ltd., (formerly known as the Sable River Copper Co.) near Massey, Sudbury.
- The Tip Top Mine, near Port Arthur, Thunder Bay.
- The Hewitson Mine, operated by the Port Arthur Copper Co., Ltd., (formerly known as the Mine Centre Copper Co.) near Shoal Lake, Rainy River.

The copper production from Ontario in 1917 amounted to 42,867,774 pounds valued at \$11,651,461, equivalent to 39.2 per cent of the production of Canada.

Details of the production of copper from the nickel-copper ores are given in the article on "Nickel". The production from the copper mines and Cobalt district amounts to a little over one per cent of the total.

The Ontario government offered a bounty on copper over 95 per cent pure metal, and on copper sulphate produced from ore mined and refined in the Province but no bounties have ever been obtained or earned. The Metal Refining Bounty Act expired 10th of April, 1917, and was not re-enacted. The text of the "Act" was quoted in the Annual Report on Mineral Production of Canada, 1914, p. 60.

Ontario: Production of Copper.

Year.	Pounds.	Value.	Year.	Pounds.	Value.	Year.	Pounds.	Value.
1886.....	165,000	\$ 18,150	1897.....	5,506,652	\$ 621,023	1908.....	15,005,171	\$ 1,981,883
1887.....	322,524	36,284	1898.....	8,375,223	1,007,539	1909.....	15,746,699	2,044,237
1888.....			1899.....	5,723,324	1,007,877	1910.....	19,259,016	2,453,213
1889.....	1,466,752	201,678	1900.....	6,740,058	1,091,215	1911.....	17,932,263	2,219,297
1890.....	1,303,065	205,233	1901.....	8,695,831	1,411,507	1912.....	22,250,601	3,635,971
1891.....	4,127,697	531,234	1902.....	7,408,202	861,278	1913.....	25,885,929	3,952,522
1892.....	2,203,795	254,538	1903.....	7,172,533	949,285	1914.....	28,948,211	3,937,536
1893.....	3,641,504	391,461	1904.....	4,913,594	630,070	1915.....	39,361,464	6,799,693
1894.....	5,207,679	497,854	1905.....	8,779,259	1,368,686	1916.....	44,997,035	12,240,094
1895.....	4,576,337	492,414	1906.....	10,638,231	2,050,838	1917.....	42,867,774	11,651,461
1896.....	3,167,256	344,598	1907.....	14,104,337	2,821,432			
						Total.....	386,487,774	67,700,101

Manitoba.

The first production of copper from Manitoba ever recorded was that of 1917 and amounted to over one million pounds—the estimated recovery from the ores shipped by the Mandy Mining Company operating near Schist lake, in the new Pas district, northern Manitoba. Much development has been carried on during the last few years and this district will soon be an important producer. A special report by Dr. Louis Bruce will soon be ready for distribution.

British Columbia.

The total quantity of copper contained in matte, blister, and copper-sulphate produced in British Columbia in 1917, and including an estimate of smelter recovery from copper ores exported, was 57,730,959 pounds, after deducting the amount of copper produced from foreign ores, as against 63,642,550 pounds in 1916, a decrease of about 9.3 per cent in quantity and 9.4 in value.

Since 1909 the method of compilation of statistics of copper production by the Provincial Bureau of Mines of British Columbia, which is based upon ore shipments from mines, provides for a deduction of five pounds of copper per ton of ore shipped on account of smelter losses, a method which gives a result closely approximating that obtained by this Branch.

British Columbia: Production of Copper.

Year.	Pounds.	Value.	Year.	Pounds.	Value.	Year.	Pounds.	Value.
1894*	324,680	\$ 31,039	1902*	29,636,057	\$ 3,445,488	1910	35,270,006	\$ 4,492,693
1895*	952,840	102,526	1903*	34,359,921	4,547,735	1911	35,279,558	4,366,198
1896*	3,818,556	415,459	1904*	35,710,128	4,579,110	1912	50,526,656	8,256,561
1897*	5,325,180	601,213	1905*	37,692,251	5,876,222	1913	45,791,579	6,991,916
1898*	7,271,678	874,783	1906*	42,990,488	8,287,706	1914	41,219,202	5,606,636
1899*	7,722,591	1,359,948	1907*	40,832,720	8,168,177	1915	56,692,988	9,793,714
1900*	9,977,080	1,615,289	1908	37,041,115	4,892,390	1916	63,642,550	17,312,046
1901*	27,603,746	4,448,896	1909	35,658,952	4,629,245	1917	57,730,959	15,691,275

* Metal contents of ores shipped as published by the Provincial Bureau of Mines.

British Columbia: Production of Copper by Districts.*

(In pounds).

—	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
Cariboo—Omineca				1,838	6,000	2,831,279	1,646,072	852,373
Cassiar—Skeena, etc		19,151	88,403	1,336	11,123,376	21,915,481	24,065,995	27,978,015
East Kootenay—								
Fort Steele							5,654	9,679
Windermere							3,400	12,640
West Kootenay—								
Nelson	231,936		26,257	815,126	586,764	30,240	176,383	50,946
Trail Creek	3,577,745	3,429,702	2,539,900	2,538,661	3,779,830	4,651,681	4,200,745	1,730,088
Yale—								
Boundary	31,354,985	22,327,359	33,372,199	28,621,973	16,428,959	17,402,662	17,626,623	10,329,765
Ashcroft & Kamloops	1,178	152,723		29,505	14,525	295,164	636,594	700,199
Similkameen				8,073		21,701	182,633	87,326
Coast districts	3,078,090	10,998,721	15,429,778	14,443,793	13,070,245	9,770,197	16,835,265	17,256,534
Tota's	38,243,934	36,927,656	51,456,537	46,460,305	45,009,699	56,918,405	65,379,364	59,007,569

* As published by British Columbia Bureau of Mines.

Copper mining is now by far the most important form of mining in the Province; in 1917 it formed nearly 60 per cent of the total value of the metalliferous mines, while in 1916 it was about 57 per cent.

In the Boundary the production was mainly from the mines of the three large smelting companies: The Granby Consolidated Mining, Smelting & Power Co., Ltd., The Mother Lode and Sunset Mines of the British Columbia Copper Co., Ltd., and the Emma Mine of the Consolidated Mining & Smelting Co.

These companies operate their own smelters and convert their matte to blister copper. The low grade ores of this district are self-fluxing and very uniform in character, averaging a little over one per cent in copper, and from \$1 to \$2 in gold and silver.

The British Columbia Copper Company have been steadily developing their properties at Princess camp in the Similkameen, employing a large number of men and

will probably be an important producer in 1918. Some properties were producing during 1917 and we may look forward to the eventual establishment in that part of the country of another important copper producing centre.

Much development and some shipments are reported from the Ashcroft and Nicola divisions, the principal operators being the Highland Valley Mining & Development Co., and the Aberdeen Mines Syndicate.

In the interior the main shippers were, at Rossland: the Centre Star and Le Roi groups, owned by the Consolidated Mining and Smelting Co., and the Le Roi II (Josie) mine.

The Consolidated Mining & Smelting Co. operates its own smelter, converts its matte to blister copper, and, since 1916, produces refined copper. It treats also in its refinery blister copper from the other smelters.

Shipments were also made from the Nelson district by the Eureka mine and a few other properties.

In the Kamloops division the Iron Mask mine is the only important shipper.

Much development work was done in the neighbourhood of New Hazelton in the Omineca mining division, and the Rocher Déboulé mine after a couple of years of extensive development, has become an important producer.

There was noted in 1915 a large increase in the production of the Coast and Cassiar districts which more than offset the falling off in the Boundary district. The increase was still more remarkable in 1916 and 1917 and was due mostly to the Hidden Creek mines on Observatory inlet, the Britannia mines on Howe sound, and the Marble Bay mines on Texada island.

Yukon.

The production from the Yukon Territory has been from the Whitehorse district. The mines in this district had been more or less idle for the past few years, but the high price of copper during 1916 and 1917 was the cause of much activity. The production in 1916 amounted to 2,807,096 pounds, valued at \$763,586; while in 1917 the production was 2,460,079 pounds valued at \$668,650.

The principal shippers by order of importance were: The Pueblo, operated by the Yukon Copper Co., Ltd., the War Eagle, Grafter, Copper King, and Anaconda.

Yukon: Production of Copper.

Year.	Pounds.	Value.	Year.	Pounds.	Value.
1906 (and previous).....	156,000	\$ 23,400	1912.....	1,772,660	\$ 289,670
1907.....	511,838	102,388	1913.....	1,843,530	281,489
1908.....	112,264	14,828	1914.....	1,367,050	185,946
1909.....			1915.....	533,216	92,113
1910.....	236,000	36,431	1916.....	2,807,096	763,586
1911.....			1917.....	2,460,079	668,650
			Total.....	11,849,733	2,458,501

GOLD.

The production of gold in Canada in 1917 amounted to 738,831 fine ounces, valued at \$15,272,992, and was made up as follows: (a) gold derived from alluvial workings \$4,145,571, or 27.1 per cent of the total; (b) gold obtained from the crushing of free milling quartz ores, i.e., stamp mill bullion \$9,248,020, or 60.6 per cent; and (c) gold obtained from ores and concentrates sent to the copper and lead smelters \$1,879,401, or 12.3 per cent of the total production.

The production in 1916 amounted to 930,492 fine ounces, valued at \$19,234,976, and was made up as follows: (a) gold derived from alluvial workings \$4,964,831 or 25.8 per cent of the total; (b) gold obtained from the crushing of free milling ores, i.e., stamp mill bullion, \$10,480,661 or 54.5 per cent of the total; and (c) gold obtained from ores and concentrates sent to the copper and lead smelters, \$3,789,484 or 19.7 per cent of the total production.

Gold was first discovered in various provinces about 1858, and the production gradually increased to over four million dollars in 1863, but fell again to \$907,601 in 1892. The discovery of gold in the Yukon and other discoveries in 1896 gave the mining industry a new impetus, resulting in a rapid increase in the gold production which, in 1900, reached the high mark of nearly twenty-eight million dollars. From this maximum it decreased again to a little over eight million dollars in 1907. With the discovery and development of the Porcupine mines in Ontario, gold production has rapidly increased again. The falling off in 1917 is due to the great increase in the cost of supplies, and difficulty in securing the necessary equipment. Another important factor was the scarcity of labor and especially in gold camps, as the miners are induced to other camps due to the high wages which depend on a sliding scale regulated by the price of metals, gold being the only metal not to benefit by enhanced market price.

Annual Production of Gold in Canada 1858-1917.

Year.	Fine ounces†	Value.	Year.	Fine ounces ‡	Value.	Year.	Fine ounces ‡	Value.
1858.....	34,104	\$ 705,000	1878.....	74,420	\$ 1,538,394	1898.....	666,386	\$13,775,420
1859.....	78,129	1,615,072	1879.....	76,547	1,582,358	1899.....	1,028,529	21,261,584
1860.....	107,806	2,228,543	1880.....	63,121	1,304,824	1900.....	1,350,057	27,908,153
1861.....	128,973	2,666,118	1881.....	63,524	1,313,153	1901.....	1,167,216	24,128,503
1862.....	135,391	2,798,774	1882.....	60,288	1,246,268	1902.....	1,032,161	21,336,667
1863.....	202,498	4,186,011	1883.....	53,853	1,113,246	1903.....	911,559	18,843,590
1864.....	199,605	4,126,199	1884.....	51,202	1,058,439	1904.....	796,374	16,462,517
1865.....	192,898	3,987,562	1885.....	55,575	1,148,829	1905.....	684,951	14,159,195
1866.....	152,555	3,153,597	1886.....	70,782	1,463,196	1906.....	556,415	11,502,120
1867.....	145,775	3,013,431	1887.....	57,460	1,187,804	1907.....	405,517	8,382,780
1868.....	134,169	2,773,527	1888.....	53,145	1,098,610	1908.....	476,112	9,842,105
1869.....	102,720	2,123,405	1889.....	62,653	1,295,159	1909.....	453,865	9,382,230
1870.....	83,415	1,724,348	1890.....	55,620	1,149,776	1910.....	493,707	10,205,835
1871.....	105,187	2,174,412	1891.....	45,018	930,616	1911.....	473,159	9,781,077
1872.....	90,283	1,866,321	1892.....	43,905	907,601	1912.....	611,885	12,648,794
1873.....	74,346	1,536,871	1893.....	47,243	976,603	1913.....	802,973	16,598,923
1874.....	97,856	2,022,862	1894.....	54,600	1,128,688	1914.....	773,178	15,983,007
1875.....	130,300	2,693,533	1895.....	100,798	2,083,674	1915.....	918,056	18,977,901
1876.....	97,729	2,020,233	1896.....	133,262	2,754,774	1916.....	950,492	19,234,976
1877.....	94,304	1,949,444	1897.....	291,557	6,027,016	1917.....	738,831	15,272,992

† Calculated from the value: one dollar = 0.048375 oz.

The Dominion Assay Office in Vancouver, operated in connexion with this Department, receives, assays, and purchases crude bullion, amalgam, nuggets, and dust, the resultant bullion being resold. The total quantity of bullion thus received during the twelve months ending December 31st., 1917, was 191,626.04, ounces, which after melting was reduced to 187,884.48 ounces and valued at \$3,257,220.71 after deducting office charges. The loss by melting was 1,953 ounces per cwt. The receipts were from British Columbia and the Yukon, with also a few ounces from Alaska.

Receipts at Dominion Assay Office, Vancouver.

Year.	Weight before melting.	Weight after melting.	Net value.	Year.	Weight befo.e melting.	Weight after melting.	Net value.
	ounces.	ounces.					
1908 (a)	90,175.48	89,117.76	\$ 1,478,894.00	1913 (b)...	111,479.94	109,920.49	\$ 1,448,625.37
1909.....	48,478.58	47,576.27	789,267.94	1914.....	166,148.83	163,523.61	2,029,251.31
1910.....	46,064.31	45,228.92	746,101.92	1915.....	183,924.49	179,751.68	2,736,302.31
1911.....	39,784.70	39,069.31	647,416.38	1916.....	180,292.83	175,393.10	2,828,239.65
1912.....	59,068.82	57,951.98	974,077.14	1917.....	191,626.04	187,884.48	3,257,220.71

(a) For 9 months only. (b) The removal of the assay charge in January, 1913, accounts for the large increase.

Refined Metal: There are two refineries producing fine gold in Canada; the Royal Mint at Ottawa, which receives shipments of gold from various provinces in the Dominion; and that of the Consolidated Mining and Smelting Co. of Canada, Ltd., at Trail, B.C., where gold is mainly recovered from the gold ores with also recoveries from the high grade silver-lead and the "dry" ores shipped to the smelter.

The production of gold by provinces is given in the following table in which it will be seen that Ontario, since the discovery of the Porcupine camp, has gradually increased its production, and to such extent that in 1917 it produced 57.3 per cent of the total, as against 52.9 per cent in 1916, 44.3 per cent in 1915, and 14.1 per cent in 1912, when Porcupine came into prominence.

Production of Gold by Provinces, 1915, 1916, and 1917.

	1915.		1916.		1917.	
	Fine ounces ‡	Value.	Fine ounces ‡	Value.	Fine ounces ‡	Value.
Nova Scotia.....	6,636	\$ 137,180	4,562	\$ 94,305	2,210	\$ 45,685
Quebec.....	1,099	22,720	1,034	21,375	1,511	31,235
Ontario.....	406,577	8,404,693	492,481	10,180,485	423,261	8,749,581
Manitoba.....					440	9,095
Alberta.....	195	4,026	82	1,695		
British Columbia (a).....	273,376	5,651,184	219,633	4,540,216	133,742	2,764,693
Yukon.....	230,173	4,758,098	212,700	4,396,900	177,667	3,672,703
Totals.....	918,056	18,977,901	930,492	19,234,979	738,831	15,272,992
		1915.		1916.		1917.
(a) As follows: Gold from placer mining		\$ 770,000		\$ 580,500		\$ 496,000
Gold from vein mining..		4,851,184		3,959,716		2,264,693
		5,651,184		4,540,216		2,764,693

‡ The exact value of fine gold is $\frac{999}{1000}$ dollars per ounce equivalent to \$20.671834. (United States Standard.)

In most cases, statistics of gold production are stated as crude bullion with value thereof. The fine ounces given in the tables in this report are calculated from the values by multiplying these by $\frac{33}{1000}$ or 0.043375.

Exports and Imports: The exports of gold in dust, nuggets, etc., during 1917 were valued at \$15,929,051, as against \$18,382,903 in 1915.

The imports during 1917 were: gold bullion valued at \$1,631,708; gold coins \$12,743,812; gold fringe \$4,857, and manufactures of gold and silver, valued at \$221,554.

Imports of Gold and Silver.

49

	Gold.			Silver.			Manufactures of Gold and Silver.			
	Bullion in bars and blocks.	Coins.	Fringe.	Bullion in bars and blocks.	Coins.	Sterling.	Leaf.	Sweepings.	Manufac- tures, n.o.p.	Electro- plated
1911.....	\$ 924,233	\$ 20,437,799	\$ 8,049	\$ 847,645	.....	\$ 232,792	\$63,454	\$ 279	\$ 44,402	\$467,491
1912.....	1,360,735	7,496,492	18,212	1,100,344	.....	240,235	70,651	10,107	108,879	737,857
1913.....	840,435	12,495,028	6,993	840,245	.....	393,925	80,772	12,788	58,738	522,402
1914.....	14,534,482	117,700,824	5,582	629,279	.....	244,376	53,715	4,794	14,914	301,038
1915.....	1,028,405	19,910,229	7,577	337,254	\$ 94	110,683	63,631	2,199	8,433	281,547
1916.....	18,648,770	17,828,695	4,882	875,157	35	123,774	42,152	2,778	24,167	302,268
1917.....	1,631,708	12,743,812	4,857	959,153	519	103,746	34,743	3,603	19,042	164,166

Nova Scotia.

The gold production of Nova Scotia which was 6,863 fine ounces in 1862, reached a maximum of 30,348 fine ounces in 1902; then decreased gradually, reaching in 1913 a minimum of 2,174 fine ounces. It is interesting to note that the production in 1915 is nearly identical to that of 1862, the first year returns were reported by the Provincial Mines Department.

The production is derived almost entirely from quartz ores and in 1917 amounted to 2,210 fine ounces, valued at \$45,685, as compared with 4,562 fine ounces valued at \$94,305 in 1916. The production in 1917 is very close to the minimum of 1913 and the great falling off is due mostly, as in other gold districts, to the high cost of supplies and labour.

Nova Scotia: Annual Production of Gold.

Year.	Tons treated	Fine ounces.	Value.	Yield of gold per ton.	Year.	Tons treated.	Fine ounces.	Value.	Yield of gold per ton.
1862....	6,473	6,863	\$141,871	\$21.91	1890....	42,749	22,978	\$474,990	\$11.11
1863....	17,000	13,180	272,448	16.02	1891....	36,351	21,841	451,503	12.42
1864....	21,431	18,883	390,349	18.21	1892....	32,552	18,865	389,965	11.98
1865....	24,421	24,011	496,357	20.32	1893....	42,354	18,436	381,095	8.99
1866....	32,157	23,776	491,491	15.28	1894....	55,357	18,834	389,338	7.04
1867....	31,384	25,763	532,563	16.96	1895....	60,600	21,919	453,119	7.47
1868....	32,259	19,377	400,555	12.41	1896....	69,169	23,876	493,568	7.13
1869....	35,144	16,855	348,427	19.91	1897....	73,192	27,195	562,165	7.68
1870....	30,824	18,740	387,392	12.56	1898....	82,747	26,054	538,590	6.50
1871....	30,787	18,139	374,972	12.17	1899....	112,226	29,876	617,604	5.50
1872....	17,089	12,352	255,349	14.94	1900....	87,390	28,955	598,553	6.85
1873....	17,708	11,180	281,122	13.05	1901....	91,948	26,459	546,963	5.32
1874....	13,844	8,623	178,244	12.87	1902....	93,042	30,348	627,357	6.68
1875....	14,810	10,576	218,629	14.76	1903....	103,856	25,533	527,806	5.08
1876....	15,490	11,300	233,585	15.08	1904....	45,436	10,362	214,209	4.71
1877....	17,369	15,925	329,205	18.95	1905....	57,774	13,707	283,353	4.90
1878....	17,989	11,864	245,253	13.63	1906....	66,059	12,223	252,676	3.82
1879....	15,936	12,980	268,328	16.83	1907....	58,550	13,675	282,686	4.82
1880....	13,997	12,472	257,823	18.42	1908....	61,536	11,842	244,799	3.97
1881....	16,556	10,147	209,755	12.66	1909....	56,790	10,193	210,711	3.71
1882....	21,081	13,307	275,090	13.04	1910....	43,006	7,928	163,891	3.81
1883....	25,954	14,571	301,207	11.60	1911....	18,328	7,781	160,854	8.78
1884....	25,186	15,168	313,554	12.44	1912....	14,360	4,385	90,638	6.51
1885....	28,890	20,945	432,971	14.98	1913....	7,324	2,174	44,935	6.13
1886....	29,010	22,038	455,564	15.70	1914....	13,156	2,904	60,031	4.56
1887....	32,280	20,009	413,631	12.81	1915....	25,204	6,636	137,180	5.44
1888....	36,178	21,137	436,939	12.08	1916....	17,497	4,562	94,305	5.38
1889....	39,160	24,673	510,029	13.02	1917....	5,916	2,210	45,685	7.72
Total...						2,186,736	906,605	18,741,272	8.57

Quebec.

The gold production in Quebec during 1917 amounted to 1,511 fine ounces, valued at \$31,235, as against 1,034 fine ounces valued at \$21,375 in 1916.

This production is derived partly from the pyritic mines of the Eastern Townships which are worked chiefly for the sulphur and copper contents of the ore, and partly for the zinc-lead ores of Notre-Dame-des-Anges, Portneuf county. No alluvial production has been reported for a number of years.

Much development is being done at the head-waters of the Harricaw river, south of Amos station on the Government Transcontinental Railway, and bullion was produced and shipped in the spring of 1918 by the Martin Gold Mining Company, which is operating a two stamp mill.

Quebec: Annual Production of Gold.

Year.	Fine ounces.‡	Value.	Year.	Fine ounces.‡	Value.	Year.	Fine ounces.‡	Value.
1877.....	583	\$12,057	1891.....	87	\$ 1,800	1905.....	191	\$ 3,940
1878.....	868	17,937	1892.....	628	12,987	1906.....	165	3,412
1879.....	1,160	23,972	1893.....	759	15,696	1907.....		
1880.....	1,605	23,174	1894.....	1,412	29,196	1908.....		
1881.....	2,741	56,661	1895.....	62	1,281	1909.....	193	3,990
1882.....	827	17,093	1896.....	145	3,000	1910.....	124	2,565
1883.....	860	17,787	1897.....	44	900	1911.....	613	12,672
1884.....	422	8,720	1898.....	295	6,089	1912.....	642	13,270
1885.....	103	2,120	1899.....	238	4,916	1913.....	701	14,491
1886.....	193	3,981	1900.....			1914.....	1,292	26,708
1887.....	78	1,604	1901.....	145	3,000	1915.....	1,099	22,720
1888.....	181	3,740	1902.....	391	8,073	1916.....	1,034	21,375
1889.....	58	1,207	1903.....	180	3,712	1917.....	1,511	31,235
1890.....	65	1,350	1904.....	140	2,900			
						Total.....	21,835	431,331

‡ Calculated from the value: one dollar=0.048375 ounce.

Ontario.

The gold production in Ontario, which in 1913 had exceeded the total of all the other years since 1886, more than doubled that figure in 1916, but showed a decrease in 1917 of 14.0 per cent as compared with the production of 1916. The 1917 production which was 57.3 per cent of the total production for Canada, amounted to 423,261 fine ounces valued at \$8,749,581, as against 492,481 fine ounces valued at \$10,180,485 in 1916.

Since 1914 Ontario has become by far the largest producer of gold in Canada, and this remarkable increase was brought about by the successful development of the Porcupine district and by the extension of milling facilities in that camp.

Ontario: Annual Production of Gold.

Year.	Fine ounces.‡	Value.	Year.	Fine ounces.‡	Value.	Year.	Fine ounces.‡	Value.
1887.....	327	\$ 6,760	1898.....	12,863	\$265,889	1909.....	1,569	\$ 52,425
1888.....			1899.....	20,394	421,591	1910.....	3,089	63,849
1889.....			1900.....	14,391	297,495	1911.....	2,062	42,625
1890.....			1901.....	11,844	244,837	1912.....	86,523	1,788,596
1891.....	97	2,000	1902.....	11,118	229,828	1913.....	219,801	4,543,690
1892.....	344	7,118	1903.....	9,096	188,036	1914.....	268,264	5,545,509
1893.....	708	14,637	1904.....	1,935	40,000	1915.....	406,577	8,404,693
1894.....	1,917	39,624	1905.....	4,402	91,000	1916.....	492,481	10,180,485
1895.....	3,015	62,320	1906.....	3,202	66,193	1917.....	423,261	8,749,581
1896.....	5,563	115,000	1907.....	3,212	66,399			
1897.....	9,157	189,294	1908.....	3,212	66,389	Total.....	2,020,424	41,765,863

‡ Calculated from the value: one dollar=0.048375 ounce.

The Porcupine district in Timiskaming, has, since its development in 1912, been the main producer. The principal shippers, by order of importance, were the following: Hollinger, Dome, McIntyre, Porcupine, Crown, Vipond, Schumacher and Dome Lake.

The Kirkland Lake district, also in Timiskaming, has become an important producer, with the Tough Oakes and Teck-Hughes mines as shippers, and the Lake Shore and Kirkland Lake as probable shippers in 1918.

The most spectacular find probably ever made was that of August, 1915, in Munro township, Timiskaming, on the Dobie-Leyson property, now called the Croesus Mine. Specimens from this property have been reported to run from 2,000 to 3,000 ounces in gold. The mine was producing in 1917.

In the Boston Creek district, Timiskaming, the promising development work on several properties attracted many prospectors to this area and resulted in new discoveries in this district. The Provincial Bureau of Mines had a report made on this district, and published in 1916.¹ The Miller Independence Mines, Ltd., is the principal operator in this district.

Much prospecting and development have been done in the adjoining district of Goodfish lake.

The recent discoveries in the Fort Matachewan district, justified an examination by A. G. Burrows, of the Ontario Bureau of Mines.² The principal operators in this new field are: The Mining Corporation of Canada, operating the Davidson property, and the Colorado Ontario Development Company, operating the Otisse claim.

The latest rush is to the Lightning River district, near Abitibi lake.

A good deal of exploration work has been done in the Kowkash district, Thunder Bay, which is reported on by Mr. P. E. Hopkins of the Ontario Bureau of Mines.³

Other gold discoveries were subsequently made in the surrounding district, the most important being at Tashota, 22 miles west of Kowkash, where gold and telluride were discovered.

The St. Anthony mine, operated by the Thunder Mining Company, at Sturgeon lake, Thunder Bay, was producing on a small scale during 1917.

In the Kenora district much interest has been caused by the report of rich gold findings on the Rognon property, near Contact Bay, Wabigoon lake, and a small production was reported in 1917. The Provincial Bureau of Mines describes this district in the 1916 Annual Report.⁴

Operations were also carried on at the Ore Chimney mine, in Frontenac county and the Cordova mine in Peterborough county.

The principal producers in Ontario during 1917 were:—

Table of Operators.

Operator.	Mine.	District.
Ore Chimney Mines Co., Ltd.	Ore Chimney.	Frontenac county.
Cordova Mines, Ltd.,	Cordova	Peterborough county.
Dome Mines Co., Ltd.	Dome	Timiskaming:—
Dome Lake Mines, Ltd.	Dome Lake	Porcupine.
Hollinger Consol. Gold Mines, Ltd.	Hollinger	"
McIntyre Porcupine Mines, Ltd.	McIntyre	"
Newray Mines, Ltd.	Newray	"
Porcupine Crown Mines, Ltd.	Porcupine Crown.	"
Porcupine Vipond Mines Co., Ltd.	Porcupine Vipond.	"
Wm. C. Offer et al.,	Porphyry Hill	"
Schumacher Gold Mines, Ltd.	Schumacher	"
Miller Independence Mines, Ltd.	McDonough	Boston Creek.
Teck Hughes Gold Mines, Ltd.	Teck Hughes	Kirkland Lake.
Tough Oakes Gold Mines, Ltd.	Tough Oakes.	" "
Croesus Gold Mines, Ltd.	Croesus.	Munro.
Thunder Mining Co.	St. Anthony.	Thunder Bay:—
		Sturgeon Lake.
Rognon Gold Mines, Ltd	Rognon.	Kenora:—
		Wabigoon Lake.

¹ Bulletin No. 29 of the Ontario Bureau of Mines, on Boston Creek and Goodfish Lake gold areas.

² Matachewan Gold Area. Bulletin No. 34, Ontario Bureau of Mines, 1918.

³ Bulletin No. 27, 1916, and Annual Report, Vol. XXVI, pp. 190-226 of the Ontario Bureau of Mines, Kowkash gold area.

⁴ Dryden Gold Area. Annual Report of the Ontario Bureau of Mines. Vol. XXVI, pp 163-189.

Manitoba.

The gold production in Manitoba during 1917 amounted to 440 ounces, valued at \$9,095 and was derived from the gold and copper ores of the new Pas district in northern Manitoba.

There has been no production reported previous to 1917.

About 85 miles northeast of Pas is Herb or Wekusko lake, where several companies are operating, the principal one, which made its first shipment early in 1917, being the Northern Manitoba Mining and Development Company.

A few miles southwest from Herb lake are: the Flin Flon lake, where much development has been carried on by the Great Sulphides Gold Mines, Ltd., and Schist lake near which operations are being carried on by the Mandy Mining Co., Ltd., a subsidiary company of the Tonopah Mining Company, and which has the distinction of being the first to ship from this new district early in 1917.

Dr. E. L. Bruce, of the Geological Survey, has been conducting an exploration of the Pas district for the past three years and his reports have appeared in the Summary Annual reports of the Geological Survey in 1915, 1916, and 1917. A special report prepared by Mr. Bruce will soon be ready for distribution.

Much exploration and development has been done in the last few years in the Big Rice Lake district, east of lake Winnipeg.

A report on Rice Lake, Pas, and Star Lake districts, prepared by Dr. R. C. Wallace, and Mr. J. S. Delury, acting for the Manitoba Public Utilities Commission, Winnipeg, was published early in 1917. The Gold Pan mine was operated during 1917, and in the spring of 1918 some specular ore was shipped from the mine, which has reached the producing stage.

Saskatchewan.

In the autumn of 1913 considerable interest was created in the reported gold discoveries at Beaver lake (Amisk lake). A number of prospectors went in with the opening of navigation. A good deal of prospecting was done during 1914, and some further work in 1915, but as yet no production has been reported. Amisk lake is the western end of the area being examined by Dr. Bruce and referred to under "Manitoba."

Alberta.

There was no gold production reported during 1917. A small recovery had been reported every year, being the recovery from the gravels of the Saskatchewan river. Operations were carried on by individuals and the returns are necessarily incomplete.

Alberta: Annual Production of Gold.

Year.	Fine ounces.†	Value.	Year.	Fine ounces.†	Value.	Year.	Fine ounces.†	Value.
1887.....	102	\$ 2,100	1897....	2,419	\$50,000	1907....	33	\$ 675
1888.....	58	1,200	1898....	1,209	25,000	1908....	50	1,037
1889.....	967	20,000	1899....	726	15,000	1909....	25	525
1890.....	193	4,000	1900....	242	5,000	1910....	89	1,850
1891.....	266	5,500	1901....	726	15,000	1911....	10	207
1892.....	508	10,506	1902....	484	10,000	1912....	73	1,509
1893.....	466	9,640	1903....	48	1,000	1913....		
1894.....	726	15,000	1904....	24	500	1914....	48	992
1895.....	2,419	50,000	1905....	121	2,500	1915....	195	4,026
1896.....	2,661	55,000	1906....	39	800	1916....	82	1,695
						1917....		
						Total	15,009	310,262

† Calculated from the value: one dollar = 0.048375 oz.

British Columbia.

The gold production of British Columbia in 1917 amounted to 133,742 fine ounces, valued at \$2,764,693, and included: (a) placer gold \$496,000, or 18.0 per cent of the total; (b) bullion from mill ore \$539,762, or 19.5 per cent; and (c) smelter recoveries \$1,728,931, or 62.5 per cent of the total production.

The production in 1916 amounted to 219,633 fine ounces, valued at \$4,540,216, and comprising: (a) placer gold \$580,500 or 12.8 per cent of the total; (b) bullion from milling ores \$290,088 or 6.4 per cent of the total; and (c) smelter recoveries \$3,069,628 or 80.8 per cent.

The total production in 1917 showed a decrease of 39 per cent and is due mostly to the labour troubles and also to the high cost of supplies and high wages exacted by the miners. It amounted to 18.1 per cent of the total production of Canada.

The statistics of lode gold represented, as closely as can be ascertained, the actual gold recovery based on smelter recoveries and bullion shipments.

The record production of placer gold is given as ascertained by the Provincial Mineralogist, who, in his Annual Report in 1916 stated that:—

“Great difficulty is found in obtaining reliable figures, since the work is, in many cases, carried out by individuals or unorganized groups of men who keep no books, frequently paying wages, or for supplies, in gold-dust, which, being readily transported, is scattered, and the tax imposed thereon by law is thus evaded.”

The production of gold from lode mining as reported by the Provincial Bureau of Mines being based upon metal contents of ore shipments is naturally somewhat higher than the record of smelter recoveries.

British Columbia: Annual Production of Gold.

Year.	Fine ounces.†	Value.	Year.	Fine ounces.†	Value.	Year.	Fine ounces.†	Value.
1858.....	34,104	\$ 705,000	1873...	61,688	\$1,275,204	1898...	142,215	\$ 2,939,852
1859.....	78,129	1,615,072	1879....	62,407	1,290,058	1899....	203,295	4,202,473
1860.....	107,806	2,228,543	1880....	49,044	1,013,827	1900....	228,916	4,732,105
1861.....	128,973	2,666,118	1881....	50,636	1,046,737	1901....	257,292	5,318,703
1862.....	128,528	2,656,903	1882....	46,154	954,085	1902....	288,383	5,961,409
1863.....	189,318	3,913,563	1883....	38,422	794,252	1903....	284,108	5,873,036
1864.....	180,722	3,735,850	1884....	35,612	736,165	1904....	275,975	5,704,908
1865.....	168,887	3,491,205	1885....	34,527	713,738	1905....	285,529	5,902,402
1866.....	128,779	2,662,106	1886....	43,714	903,651	1906....	269,886	5,579,039
1867.....	120,012	2,480,868	1887....	33,558	693,709	1907....	236,216	4,883,020
1868.....	114,792	2,372,972	1888....	29,884	616,731	1908....	286,858	5,929,880
1869.....	85,865	1,774,978	1889....	28,489	588,923	1909...	250,320	5,174,579
1870.....	64,675	1,336,956	1890....	23,918	494,436	1910....	261,386	5,403,318
1871.....	87,048	1,799,440	1891....	20,792	429,811	1911....	238,496	4,930,145
1872.....	77,931	1,610,972	1892....	19,327	399,525	1912....	251,815	5,205,485
1873.....	63,166	1,305,749	1893....	18,360	379,535	1913....	297,459	6,149,027
1874.....	89,233	1,844,618	1894....	25,664	530,530	1914....	252,730	5,224,393
1875.....	119,724	2,474,904	1895....	61,289	1,266,954	1915....	273,376	5,651,184
1876.....	86,429	1,786,648	1896....	86,504	1,788,206	1916....	219,633	4,540,216
1877.....	77,796	1,608,182	1897....	131,805	2,724,657	1917....	133,742	2,764,693
						Total...	7,970,291	164,781,248

Calculated from the value: one dollar = 0.048375 oz.

British Columbia: Production of Gold by Districts, 1916 and 1917.*

Districts.	1916.				1917.			
	GOLD PLACER.		GOLD LODE.		GOLD PLACER.		GOLD LODE.	
	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.
Cariboo:—								
Cariboo.....	7,900	\$158,000			6,750	\$135,000		
Queensland.....	1,000	20,000			750	15,000		
Omineca.....	850	17,000	1,303	\$ 26,933	600	12,000	931	\$ 19,244
Cassiar:—								
Atlin.....	16,925	338,500	736	15,213	15,250	305,000	1,000	20,670
All others.....	1,100	22,000	3,806	78,670	350	7,000	9,805	202,669
East Kootenay:—								
Fort Steele.....	200	4,000			100	2,000		
West Kootenay:—								
Ainsworth.....			45	930			1	20
Nelson.....	50	1,000	4,107	84,891	50	1,000	2,521	52,109
Slocan.....			64	1,323			18	372
Trail creek.....			129,790	2,682,759			33,290	688,104
Others.....	50	1,000	22	455	50	1,000	62	1,282
Lillooet:—								
Lillooet.....	250	5,000	2,625	54,259	300	6,000	3,092	63,912
Yale:—								
Grand Forks, Greenwood and Osoyoos.....	50	1,000	75,628	1,563,231	50	1,000	55,544	1,210,104
Similkameen, Nicola and Vernon.....	450	9,000	32	661	400	8,000	111	2,294
Yale, Ashcroft and Kamloops.....	150	3,000	570	11,782	100	2,000	1,355	28,008
Coast.....	50	1,000	3,204	66,227	50	1,000	3,793	78,402
Total.....	29,025	580,500	221,932	4,587,334	24,800	496,000	114,523	2,367,190

*From Annual Report of the Minister of Mines for British Columbia.

Yukon.

The gold production of the Yukon in 1917 amounted to 177,667 fine ounces valued at \$3,672,703 and included 1,119 ounces valued at \$23,091 derived from lode mining. The production in 1916 was 212,700 ounces valued at \$4,396,900 and included 690 ounces valued at \$14,264 derived from lode mining.

The production in 1917 constituted 24.0 per cent of the total production of Canada.

The total placer production of the Yukon in 1917 is estimated at \$3,681,912 and includes 176,548 fine ounces of gold valued at \$3,649,571 and 39,723 fine ounces of silver valued at \$32,341.

The placer production of the Yukon in 1916 was estimated at 212,010 fine ounces of gold, valued at \$4,382,636, and 47,703 fine ounces of silver, valued at \$31,322, making a total valuation of \$4,413,958.

The statistics of production of gold in the Yukon district during the years between 1898 and 1906, as given in the table showing the annual production, are based primarily on the receipts of gold at the United States mints and receiving offices credited to the Canadian Yukon. Although a royalty was exacted on the gold output, it seems certain that considerable amounts of gold were produced which escaped royalty payment especially during the years of high production.

Annual Production of Gold in Yukon.

Year.	Fine ounces.†	Value.	Year.	Fine ounces.†	Value.	Year.	Fine ounces.†	Value.
1885			1896...	14,513	\$ 300,000	1907...	152,381	\$ 3,150,000
1886	4,837	\$ 100,000	1897...	120,937	2,500,000	1908...	174,150	3,600,000
1887....	3,386	70,000	1898...	483,750	10,000,000	1909...	191,565	3,960,000
1888....	1,935	40,000	1899...	774,000	16,000,000	1910*	221,091	4,570,362
1889....	8,466	175,000	1900...	1,077,553	22,275,000	1911...	224,197	4,634,574
1890....	8,466	175,000	1901...	870,750	18,000,000	1912...	268,447	5,549,296
1891....	1,935	40,000	1902...	701,437	14,500,000	1913...	282,838	5,846,780
1892....	4,233	87,500	1903...	592,594	12,250,000	1914...	247,940	5,125,374
1893....	8,514	176,000	1904...	507,938	10,500,000	1915...	230,173	4,758,098
1894....	6,047	125,000	1905...	381,001	7,876,000	1916...	212,700	4,396,900
1895....	12,094	250,000	1906...	270,900	5,600,000	1917...	177,667	3,672,703
						Total...	8,238,435	170,303,587

†Calculated from the value: one dollar=0.048375 oz.

*Including a small production from lode mines.

Since 1906 the statistics of gold production of the Yukon have been based on the royalty of $2\frac{1}{2}$ per cent which is collected by the Interior Department. For the purpose of collecting the royalty, a fixed value of \$15 per ounce is placed on the crude gold. The actual value of the deposits for a number of years, has been about \$16.50 per ounce. At the Dominion Government Assay Office at Vancouver, B.C., there was deposited during the twelve months ending December 31, 1917, 79,532.35 ounces from the Yukon, valued after all charges had been deducted, at \$1,262,207, or an average of \$15.87 per ounce, as against 95,005.82 ounces, valued at \$1,525,723.55, or an average of \$16.06 per ounce in 1916.

**Receipts from the Yukon, at the Dominion Government Assay Office,
Vancouver, B.C.**

Year.	Weight before Melting.	Net Value.	Average Value.	Year.	Weight before Melting.	Net Value.	Average Value.
	Ounces.				Ounces.		
1908 (a)	60,132.00	\$1,000,296	\$16.63	1913 (b)	15,235.29	\$ 247,189	\$16.22
1909	5,003.12	83,871	16.75	1914	56,564.83	915,914	16.21
1910	3,594.87	62,094	17.27	1915	87,040.87	1,418,497	16.28
1911	2,073.61	34,994	16.88	1916	95,005.82	1,525,724	16.06
1912	2,211.88	36,481	16.41	1917	79,532.35	1,262,207	15.87

(a) For nine months only.

(b) The removal in 1913 of the assay charge accounts for the great increase.

The production of crude placer gold in the Yukon district the past six years, as ascertained by the Interior Department, and upon which a royalty of $2\frac{1}{2}$ per cent has been collected, is shown in the accompanying table:—

Production of Crude Gold in the Yukon District.

(Gross weight of dust, nuggets, and bullion in ounces.)

Month.	1912.	1913.	1914.	1915.	1916.	1917.
January.....	5.25	19.30	136.50	520.69	3,116.18	2,490.11
February.....	525.29	56.90	325.50	.40	566.62	740.73
March.....	0.50		6.75	232.13	1,574.82	1,033.37
April.....		1,293.69	1,572.65	277.84	859.56	1,290.64
May.....	26,158.66	5,557.35	11,668.10	17,553.29	13,099.13	7,586.43
June.....	54,243.03	67,594.39	67,604.85	57,884.87	38,292.47	33,634.56
July.....	58,283.29	57,873.50	45,067.31	49,478.87	35,598.34	34,339.33
August.....	56,975.55	63,315.92	49,458.17	41,015.41	47,980.26	41,439.50
September.....	53,225.29	58,641.62	62,744.69	47,055.83	45,883.90	33,632.12
October.....	66,518.01	66,798.37	63,365.22	59,984.89	62,927.73	57,227.13
November.....	11,648.08	26,565.50	4,308.00	7,248.17	13,168.23	4,184.74
December.....	7,432.72	5,183.50	3,433.43	6,001.77	1,944.64	3,015.97
	335,015.67	352,900.04	309,691.17	287,254.16	265,013.88	220,684.53

Since 1898 a royalty to the extent of \$4,575,217.59 has been collected on the gold production of this district. The yearly amounts collected, as well as the annual production of gold as ascertained by the Interior Department, are shown in the accompanying table. The difference between these figures and those shown in the table of annual production of the district which are based on mint receipts of Yukon gold, has already been mentioned, and is probably due to three factors: (1) the fixing of the value of the gold for royalty purposes at \$15 per ounce, (2) the probability that in the earlier years of royalty collection considerable quantities of gold dust left the camps unrecorded and escaped royalty payments, and (3) the fact that in the last few years there has been a small but growing production from the lode mines.

Gold Production in the Yukon, the Royalty Collected.†

Fiscal Year.	Total Gold Production.	Total Exemption.	Royalty Collected on.	Royalty Paid.
Ending June, 1898.....	\$ 3,072,773	\$ 339,845	\$ 2,732,928	\$273,292.82
" " 1899.....	7,582,283	1,699,657	5,882,626	588,262.37
" " 1900.....	9,809,465	2,501,744	7,307,720	730,771.99
" " 1901.....	9,162,083	1,927,666	7,234,416	592,660.98
" " 1902.....	9,566,340	1,199,114	8,367,226	331,436.79
" " 1903.....	12,113,015		12,113,015	302,893.48
" " 1904.....	10,790,663		10,790,663	272,217.96
" " 1905.....	8,222,054		8,222,054	206,760.87
" " 1906.....	6,540,007		6,540,007	163,963.25
March, 1907.....	3,304,791		3,304,791	82,622.42
" " 1908.....	2,820,162		2,820,162	70,504.65
" " 1909.....	3,260,283		3,260,282	81,507.07
" " 1910.....	3,594,251		3,594,251	89,844.10
" " 1911.....	4,126,728		4,126,728	103,168.19
" " 1912.....	4,024,237		4,024,237	100,606.29
" " 1913.....	5,018,412		5,018,412	125,460.52
" " 1914.....	5,301,508		5,301,508	132,537.69
" " 1915.....	4,649,634		4,649,634	116,241.04
" " 1916.....	4,458,278		4,458,278	111,457.19
" " 1917.....	3,960,207		3,960,207	99,007.92
Total.....	121,377,173		113,709,146	4,575,217.59

† From the Report of the Yukon and Mining Lands Branch of the Department of the Interior, Fiscal Year ending March 31, 1917, p. 50.

IRON AND STEEL.

(INTRODUCTORY.)

The production of steel in Canada has been greatly stimulated by the demands created by the war and the production of both pig-iron and steel reached their highest output during 1917. The construction of new steel furnaces, including several electric furnaces, has greatly increased the steel-producing capacity, whereas pig-iron blast furnace capacity has remained practically stationary and pig-iron production has been brought to an output only slightly in excess of that obtained in 1911 and 1912.

The Canadian iron and steel industry continues to be based to a very large extent on imported iron ores and fuels. Only 4.2 per cent of the total iron ore charged to blast furnaces during 1917 was obtained from Canadian mines, the balance being imported from Newfoundland and the United States.

If the ores from Wabana, Newfoundland, be added to those from Canada, then about 44.4 per cent of the total blast furnace ore charge in 1917 was derived from British sources and 55.6 per cent from the United States.

It was shown in the report for 1913 that the total consumption of iron and steel in Canada during that year, which has probably been the maximum consumption of iron reached, was equivalent to from 6,000,000 to 7,000,000 tons of iron ore of 50 per cent grade. The Canadian production of iron ore during the same year was less than 5 per cent of this amount. The production of iron ore in Canada in 1917 was the lowest since 1900 with the one exception of the year 1911.

Trade in almost all classes of iron and steel products has become subject to government control and exports from Canada can be made only under license obtained from the War Trade Board. Similarly, exports from the United States to Canada can be made only under license obtained from the United States War Industries Board.

Prices, also, which had rapidly increased during 1916 and 1917, were placed under control in the United States in July of the later year, and since Canadian consumption is being derived so largely from the United States it may be of interest to quote the price basis as follows:—

September 24, 1917.—Statement issued by Committee on Public Information (*Official Bulletin*, September 25, 1917):

“The President has approved an agreement between the War Industries Board and the steel men, fixing the following prices, which become effective immediately and are subject to revision January 1, 1918, viz.:

Commodity.	Basis.	Price agreed upon.
Iron ore.....	Lower Lake Ports.....	\$ 5.05 per G. T.
Coke.....	Connellsville.....	6.00 per N. T.
Pig-iron.....	Pittsburgh-Chicago.....	33.00 per G. T.
Steel bars.....	" "	2.90 per 100 lb.
Shapes.....	" "	3.00 per 100 lb.
Plates.....	" "	3.25 per 100 lb.

Subsequently the maximum prices were agreed upon covering the entire range of iron and steel products.

Summary of Iron and Steel Statistics, 1914-17.

	1914.	1915.	1916.	1917.
Iron ore shipped from minesShort tons.	244,854	398,112	275,176	215,302
Canadian iron ore charged to blast furnaces. "	182,964	293,305	221,773	92,065
Imported iron ore charged to blast furnaces. "	1,324,326	1,463,488	1,964,598	2,084,231
Iron ore charged to steel furnaces."	37,686	74,872	55,059	39,793
Pig-iron made in blast furnaces"	783,164	913,775	1,169,257	1,156,789
Pig-iron made in electric furnaces."				13,691
Pig-iron and ferro-alloys exported."	19,063	26,545	46,166	45,293
Pig-iron imported."	78,680	47,842	58,130	83,400
Ferro-alloys made"	7,524	10,794	28,628	42,465
Ferro-alloys imported."	22,147	13,758	14,777	12,829
Pig-iron and ferro-alloy consumption."	872,452	959,254	1,255,218	1,264,870
Pig-iron used in steel furnaces"	619,030	747,884	949,444	1,112,082
Steel ingots and castings made."	828,641	1,020,336	1,428,249	1,745,734
Steel rails made."	428,225	232,411	90,123	46,645
Canadian coke used in iron blast furnaces. .	330,269	578,743	712,715	634,962
Imported coke used in iron blast furnaces. .	590,902	486,022	645,488	723,657
Iron and steel imported."	878,179	771,007	864,916	929,776
Number of completed blast furnaces.No.	22	19	20	
Number of men employed in blast furnaces. .	1,018	1,004		
Wages paid in blast furnaces."	693,632	675,453		
Value of pig-iron produced."	10,002,856	11,374,199	16,750,898	24,290,101
Value of iron and steel goods exported."	14,391,746	48,268,148	63,837,681	46,791,681
Value of iron and steel goods imported."	80,063,679	74,308,983	129,090,168	186,538,538

Average Monthly Prices of Iron and Steel Products in Pittsburgh in 1917.*

—	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
<i>Pig-Iron.</i>	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Bessemer per g. ton	35 95	35 95	37 45	42 20	44 95	55 20	57 95	53 55	48 30	37 25	37 25	37 25
Basic. "	30 95	30 95	32 85	39 20	42 15	50 20	53 20	52 75	46 20	33 95	33 95	33 95
Foundry No. 2 .. "	31 95	33 95	36 55	39 95	43 55	51 00	55 95	55 55	48 95	33 95	33 95	33 95
Malleable. "	31 95	34 45	36 95	39 95	43 65	51 05	53 95	55 55	50 525	35 20	34 45	34 45
Gray Forge. "	30 95	30 95	32 75	38 20	42 25	49 60	52 95	52 95	47 425	32 45	32 95	32 95
<i>Ferro Alloys.</i>												
Ferro silic. (50%) "	122 50	156 25	175 00	187 50	230 00	230 00	237 50	225 00	212 50	171 25	157 50	172 50
Ferro-silic. (10%) "	42 00	42 00	49 80	57 50	67 00	82 50	92 25	95 00	95 00	80 00	55 00	55 00
<i>Semi-finished.</i>												
Bessemer Billets .. "	60 00	62 50	67 00	72 50	85 00	93 75	100 00	93 00	73 75	58 75	47 50	47 50
Open h. Billets. .. "	60 00	62 50	67 50	72 50	85 00	93 75	100 00	93 00	73 75	58 75	47 50	47 50
Bessemer sh. bars .. "	60 00	62 50	67 50	72 50	88 00	101 25	105 00	96 00	82 50	65 50	51 00	51 00
Open-hearth sheet bars. "	60 00	62 50	67 50	72 00	88 00	101 25	105 00	96 00	82 50	65 50	51 00	51 00
Wire rods. "	73 75	75 00	75 00	83 75	88 00	92 50	95 00	96 00	90 00	73 50	57 00	57 00
<i>Rolled products.</i>												
Per 100 lbs.												
Structural shapes, base.	3 10	3 25	3 45	3 70	4 00	4 00	4 50	4 50	3 75	3 00	3 00	3 00
Plates, base.	3 60	3 75	4 20	4 50	4 50	4 50	5 65	6 80	6 85	3 25	3 25	3 25
Steel bars, base.	2 95	3 00	3 20	3 40	3 50	3 65	3 90	4 00	3 73	2 90	2 90	2 90
Bar iron, base.	3 25	3 25	3 25	3 40	3 90	4 60	5 00	5 25	5 25	5 25	3 90	3 50
Shafting, discount ..	10 00	10 00	10 00	10 00	10 00	5 00	5 00	5 00	5 00	6 25	17 0	17 00
Steel pipe, $\frac{3}{4}$ to 3 in. disc	64 00	63 50	60 00	55 00	49 00	47 25	42 00	42 00	42 00	42 00	49 00	51 00
Standard spikes.	3 40	3 40	3 50	3 65	3 90	4 20	4 70	6 20	6 50	6 15	5 00	4 75
Hoops.	3 50	3 50	3 90	4 10	4 70	5 75	6 00	6 00	6 00	6 00	4 60	3 50
Bands.	3 00	3 00	3 35	3 35	3 60	5 50	6 00	6 00	6 00	6 00	4 30	2 90
Structural rivets.	4 25	4 25	4 50	4 75	5 05	5 25	5 25	5 25	5 25	5 25	5 00	4 65
No. 28 blacksheets.	4 55	4 55	5 05	5 75	7 00	8 15	9 00	9 00	8 75	7 75	5 25	5 00
" gal. sheets.	6 55	6 80	6 80	7 55	8 80	9 95	10 25	10 25	9 70	8 80	6 60	6 25
No. 10 blue annealed sheets.	4 10	4 35	4 70	5 35	6 65	8 00	8 50	8 50	8 50	7 85	4 75	4 25
Tin plate.	6 85	7 00	7 50	7 50	7 90	9 25	10 00	10 00	10 00	10 00	8 75	7 75
Wire nails, base.	3 00	3 00	3 16	3 20	3 50	3 65	4 00	4 00	4 00	3 90	3 50	3 50
Plain wire, base.	2 95	2 95	3 08	3 18	3 45	3 60	3 95	3 95	3 95	3 85	3 25	3 25
<i>Old Material.</i>												
Per net ton.												
Heavy melting steel.	23 25	21 90	23 40	28 15	28 40	40 00	40 25	36 60	35 50	31 30	29 60	30 00
Low Phosphorus.	32 00	30 00	33 00	34 25	36 60	43 50	52 75	43 00	47 25	43 50	39 00	39 00
No. 1 cast.	20 00	19 75	21 50	23 35	24 60	33 25	34 75	35 00	32 50	28 00	28 50	28 50

* From "Iron Trade Review," Cleveland, O., Jan. 3, 1918, p. 126.

IRON ORE.

Shipments of iron ore were made during 1917 from nine mines or properties, but at five properties only were mining operations in progress, shipment from the other four being made from ore piles remaining from operations of previous years. The total shipments were less than in 1916 by 59,874 tons, a decrease of 21 per cent, and with the exception of 1911 were the lowest since 1910. The total shipments for the year were 215,302 tons valued at \$758,621 as against 275,176 tons valued at \$715,107 in 1916.

In 1917 shipments included 46,050 tons marketed in Canada and 169,252 tons sold for export. In 1916, 134,568 tons were reported as marketed in Canada and 140,608 tons sold for export. The ores shipped in 1917 comprised 17,741 tons of magnetite, titaniferous magnetite and ilmenite and 197,561 tons of roasted mixture of siderite and high sulphur hematite. The 1916 shipments included 45,541 tons of hematite; 210,522 tons of siderite and high sulphur hematite, roasted; 15,904 tons of magnetic concentrates and 3,200 tons of ilmenite.

There were no shipments of iron ore from Nova Scotia or New Brunswick deposits during the year, though some development work was done by the Nova Scotia Steel and Coal Company, at Glencoe in Cape Breton. The Nictaux Nova Scotia and Bathurst New Brunswick properties owned by the Canada Iron Foundries, Ltd., still remain idle.

In Quebec the ilmenite property at Ivry-on-the-Lake, Terrebonne county, was again operated by the Manitou Iron Mining Company, the output being shipped as usual to Niagara Falls, N.Y.

Some titaniferous ores were also mined by the Baie St. Paul Titanic Iron Ore Company from the property "312" St. Urbain, Charlevoix county.

In addition to these active mining operations some magnetite ore was shipped from old dumps remaining at the Bristol mines in Pontiac county and at Ironsides in Hull township. The latter ore was shipped to Hull and Montreal and used in the calcining of magnesite at these places.

In Ontario the Algoma Steel Corporation was the principal shipper, operating the Helen and Magpie mines. The Helen mine output during the past two years has consisted chiefly of high sulphur hematite which has been shipped to the Magpie plant and there mixed with siderite. The blended ore is roasted in rotary kilns producing a Bessemer grade of ore part of which was shipped to the company's furnaces at Sault Ste. Marie, but the greater portion going to United States furnaces.

Work on the magnetite ores at Sellwood owned by Moose Mountain, Ltd., was chiefly on construction and development including the experimental operation of the concentrating and briquetting plant during the last six months of the year. A few hundred tons only of concentrate and briquettes averaging over 62 per cent iron were shipped to plants in southern Ontario. A small shipment of titaniferous ore was made from the Orton mine in Hastings county by the Tivani Electric Steel Company of Belleville, and of hematite ore from the Playfair mine, near Perth, by the Canadian Union Iron Mines Corporation, Ltd.

Shipments of Iron Ore by Provinces, 1915-16-17.

Provinces.	1915.		1916.		1917.	
	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.
		\$		\$		\$
New Brunswick	3,683	8,261				
Quebec			3,209	8,308	17,189	54,815
Ontario	394,429	766,166	271,967	706,799	198,113	703,806
	398,112	774,427	275,176	715,107	215,302	758,621

Shipments of Iron Ore by Classes of Ore, 1907-1917.

In Short Tons.

Year.	Hematite.	Magnetite.	Carbonate Including Siderite.	Bog Ore.	Total.
1907	205,795	50,073	42,740	14,248	312,856
1908	173,164	49,946	4,869	10,103	238,082
1909	190,473	74,240		3,330	268,043
1910	130,380	127,768		1,270	259,418
1911	137,399	72,945			210,344
1912	86,971	128,912			215,883
1913	(a) 92,386	215,248			307,634
1914	89,454	45,562	109,838		244,854
1915	205,989	59,217	132,906		398,112
1916	45,541	19,113	(b) 210,522		275,176
1917		17,741	197,561		215,302

(a) Small tonnage of siderite included.

(b) Includes roasted siderite and a blend of siderite and high sulphur hematite, roasted.

Shipments of Iron Ore by Provinces, 1886-1917.

Calendar Year.	New Brunswick.	Nova Scotia.	Quebec.	Ontario.	British Columbia.	Total. Short Tons.
1886		44,388		16,032	3,941	64,361
1887		43,532	13,404	15,698	2,796	76,330
1888		42,611	10,710	16,894	8,372	78,587
1889		54,161	14,533		15,487	84,181
1890		49,206	22,305	5,000		76,511
1891		53,649	14,380		950	68,979
1892		78,258	22,690		2,300	103,248
1893		102,201	22,076		1,325	125,602
1894		89,379	19,492		1,120	109,991
1895		83,792	17,783		1,222	102,797
1896		58,810	17,630	15,270	196	91,906
1897		23,400	22,436	2,770	2,099	50,705
1898		19,079	17,873	21,111	280	58,343
1899		28,000	19,420	25,126	2,071	74,617
1900		18,940	19,000	82,950	1,110	122,000
1901		18,619	15,489	272,538	7,000	313,646
1902		16,172	18,524	359,288	10,019	404,003
1903		40,335	12,035	209,634	2,290	264,294
1904		61,293	16,152	141,601		219,046
1905		84,952	12,681	193,464		291,097
1906		97,820	9,933	141,078		248,831
1907		89,839	12,748	207,769	2,500	312,856
1908		11,802	10,103	216,177		238,082
1909			4,150	263,893		268,043
1910	5,336	18,134	4,503	231,445		259,418
1911	31,120	22	3,616	175,586		210,344
1912	71,520	30,857	1,185	112,321		215,883
1913	86,416	20,436	5,102	195,680		307,634
1914	4,775			240,079		244,854
1915	3,683			394,429		398,112
1916			3,209	271,967		275,176
1917			17,150	198,152		215,302

EXPORTS AND IMPORTS OF IRON ORE.

Mine operators have reported directly the quantity of iron ore sold for export during the calendar year 1917 as 169,250 tons, as against 140,608 tons sold for export in 1916, 89,730 tons in 1915, and 60,414 tons in 1914. These records differ slightly

from those reported by the Department of Customs and shown in the table. The United States Department of Commerce record of imports from Canada is also given for comparison.

The customs record of imports of iron ore is shown in the table, the total for 1917 being only slightly less than that of 1916 but at a considerably higher price.

According to returns received from blast furnace operators the quantity of imported ores charged to blast furnaces during 1917 was 2,084,231 tons, as against 1,964,598 tons in 1916. The imported ores charged in 1917 included 874,134 tons from Newfoundland and 1,210,097 tons from the United States "Lake district." In 1916 the imported ores charged included 914,194 tons from Wabana, Newfoundland, and 1,050,404 tons of United States "Lake ores."

The total quantity of imported ores charged to Canadian blast furnaces since 1886 has been 21,493,125 tons, while the total quantity of iron ore shipped from Canadian mines during the same period was 5,974,779 tons.

Exports of Iron Ore.

Calendar Year.	Canadian Customs Record.			Calendar Year.	Imports into the United States from Canada.*		
	Short tons.	Value.	Average value.		Short tons.	Value.	Average value.
		\$	\$			\$	\$
1909.....	21,956	61,954	2·82				
1910.....	114,499	324,186	2·83				
1911.....	37,686	133,411	3·54	1911.....	56,538	106,038	1·87
1912.....	118,129	382,005	3·23	1912.....	119,476	201,882	1·69
1913.....	126,124	426,681	3·38	1913.....	201,443	409,098	2·03
1914.....	135,451	360,974	2·67	1914.....	58,816	153,415	2·61
1915.....	79,770	206,823	2·59	1915.....	94,219	245,092	2·60
1916.....	161,260	541,779	3·36	1916.....	153,255	509,602	3·32
1917.....	164,004	660,673	4·03	1917.....	200,239	766,688	3·83

*Compiled from the "Foreign Commerce and Navigation of the United States."

Imports of Iron Ore, 1912-1917.

Calendar Year.	United States.		Newfoundland.		Other Countries.		Total.	
	Short tons.	Value.	Short tons.	Value.	Short tons.	Value.	Short tons.	Value.
		\$		\$		\$		\$
1912(*9 mos.) ...	1,206,567	3,090,207	840,892	840,892	50	975	2,047,509	3,932,074
1913.....	1,072,156	3,007,653	869,669	869,669	500	502	1,942,325	3,875,824
1914.....	749,979	1,972,550	389,850	389,850	7,279	24,958	1,147,108	2,387,358
1915.....	715,060	1,568,866	789,029	762,328	24	561	1,504,113	2,331,755
1916.....	1,364,992	3,463,419	974,685	955,594			2,339,677	4,419,013
1917.....							2,251,397	5,124,889

*Imports of iron ore separately stated in Customs Reports from April 1912 only.

PRODUCTION OF IRON ORE IN NEWFOUNDLAND.

The iron ore deposits at Wabana, Newfoundland, are owned and operated by the two Canadian companies operating coal mines and steel plants at Sydney and Sydney Mines, Cape Breton. The shipments from Wabana mines during 1917 were 883,346 short tons, all of which went to Cape Breton. The total shipments from Wabana since the mines were first operated in 1895 have amounted to 17,421,042 short tons, of which 11,622,287 tons were sent to Nova Scotia, 2,078,197 tons to the United States, and 3,720,558 tons to Great Britain and Europe.

Annual Shipments of Iron Ore from Wabana Mines, Newfoundland.

Calendar Year.	To Nova Scotia.	To United States.	To Great Britain and Europe.	Total Shipments.
	Short tons.	Short tons.	Short tons.	Short tons.
1895.....	2,686	.....	.....	2,686
1896.....	17,410	22,798	.....	40,208
1897.....	12,143	33,039	5,651	50,833
1898.....	34,622	.....	78,640	113,262
1899.....	26,311	98,485	214,322	339,118
1900.....	195,507	153,867	14,776	364,150
1901.....	457,064	84,292	279,102	820,458
1902.....	376,322	96,702	341,421	814,445
1903.....	273,283	90,711	287,793	651,787
1904.....	342,710	6,025	298,694	647,429
1905.....	506,819	6,490	255,846	769,155
1906.....	628,152	141,854	213,867	983,873
1907.....	672,561	123,972	167,074	963,607
1908.....	713,772	59,532	200,033	973,337
1909.....	697,068	241,207	171,722	1,109,997
1910.....	808,762	247,336	203,528	1,259,626
1911.....	737,261	207,193	237,009	1,181,463
1912.....	956,458	191,779	183,673	1,331,910
1913.....	1,048,433	229,402	328,086	1,605,921
1914.....	417,409	43,513	172,998	633,920
1915.....	802,128	.....	66,323	868,451
1916.....	1,012,060	.....	.....	1,012,060
1917.....	883,346	.....	.....	883,346
Total.....	11,622,287	2,078,197	3,720,558	17,421,042

IRON ORE PRICES.

The prices of Canadian iron ores are naturally based on prices current in the United States. "Lake ores," that is, those originating in what is generally known as the Lake Superior iron region, and which contributes about 80 per cent of the iron and steel requirements of the United States are quoted per gross ton delivered at Lake Erie ports. Ore prices and freights are usually fixed at the beginning of each season, and the price of any individual ore then depends on its variation from the standard in iron and phosphorus content, etc.

Bessemer ores are quoted on the basis of 55 per cent iron natural and 0.045 per cent phosphorus dried at 212° F. The base for Non-Bessemer ores is 51.5 per cent iron natural.

Iron ore prices per gross ton during the past four years have been as follows:—

	1914 and 1915.	1916.	1917 to July 1, 1918.	From July 1, 1918.
Old Range Bessemer.. . . .	\$3 75	\$4 45	\$5 95	\$6 40
Mesabi Bessemer.. . . .	3 50	4 20	5 70	6 15
Old Range Non-Bessemer .. .	3 00	3 70	5 20	5 65
Mesabi Non-Bessemer.	2 85	3 55	5 05	5 50

Since 1900 the price of Old Range Bessemer ores has ranged between a minimum of \$3 in 1904 and a maximum of \$6.48 in 1900, Non-Bessemer ores being generally from 50 to 80 cents lower.

LAKE FREIGHT RATES.

Lake freight rates on iron ore from upper lake ports to lake Erie during the past four years have been as follows, in cents per ton:—

	1914.	1915.	1916.	1917.
From Escanaba, Mich.	35	25	35	75
" Marquette, Minn.	45	35	45	90
" the head of the Lakes.	50	40	50	100

The Marquette rate which covers shipments from Michipicoten fell from a maximum of 94 cents in 1900 to a minimum of 35 cents in 1915. The 1917 rate approaches very closely to the record.

Shipments from Key Harbour (Moose Mountain ore) have been at the Escanaba rate or 10 to 15 cents lower than Michipicoten.

The above rates are quoted net, there is an additional unloading charge of 10 cents per ton.

IRON ORE PRODUCTION IN THE UNITED STATES.

The shipments of iron ore from the Lake Superior district during 1917, including both rail and water shipments, were 64,275,000 gross tons, as compared with 66,394,507 tons shipped in 1916. The shipments in 1915 were 47,272,751 tons, in 1914, 32,729,726 tons; in 1913, 49,947,116 tons; and in 1912, 48,221,546 tons.

The total shipments of iron ore in the United States from all sources were in 1917, 75,573,181 gross tons as compared with 77,870,553 gross tons in 1916; 55,493,100 gross tons in 1915; 41,439,761 gross tons in 1914, and 61,980,437 gross tons in 1913.

During the past twenty years the Lake Superior district has supplied from 80 to 95 per cent of the total United States production.

PIG-IRON.

The total production of pig-iron in 1917, not including the output of ferro-alloys was 1,170,480 short tons (1,045,071 long tons) valued at \$25,025,960, as compared with 1,169,257 short tons (1,043,979 long tons) valued at \$16,750,898 in 1916.

The 1917 production included in addition to blast furnaces output a small quantity of high grade low phosphorus pig-iron made in electric furnaces the demand and high price offered for this grade of iron having made its manufacture from scrap steel in electric furnaces a profitable operation.

The electric pig-iron so produced amounted to 13,691 tons valued at \$735,859, or an average of \$53.75 per ton, and the production from blast furnaces was 1,156,789 short tons valued at \$24,290,101. Thus, although the total production of pig-iron was slightly greater than in 1916 the actual production in blast furnaces was somewhat less than during the previous year.

The Nova Scotia production, all blast furnace pig, was 472,147 tons as against 470,055 tons in 1916, and was the highest output made since 1913 when the maximum production of 480,068 tons was reached.

The Ontario production shown as 698,333 tons included 684,642 tons of blast furnace pig, and 13,691 tons of pig-iron made from scrap steel in electric furnaces. Though included with the Ontario record a portion of the electric furnace output was made in electric furnace plants at Montreal and Shawinigan Falls, Quebec.

Of the total output in 1917, 14,092 tons were made with charcoal as against 17,304 tons made with charcoal in 1916.

By grades, the 1917 production included: Basic, 961,656 tons; Bessemer, 27,783 tons; and foundry and all other, 181,041 tons. The 1916 production included: Basic, 953,627 tons; Bessemer, 31,388 tons; foundry and malleable, etc., 184,242 tons.

Annual Production of Pig-Iron by Provinces, 1887-1917.

Year.	Nova Scotia.		Ontario.		Quebec.		Total.	
	Short Tons.	Value.	Short tons.	Value.	Short tons.	Value.	Short tons.	Value.
		\$		\$		\$		\$
1887.	19,320	250,000			5,507	116,192	24,827	366,192
1888.	17,556	211,403			4,243	101,832	21,799	313,235
1889.	21,289	383,202			4,632	116,670	25,921	499,872
1890.	18,882	262,608			3,390	69,080	21,772	331,688
1891.	20,840	297,728			3,051	71,173	23,891	368,901
1892.	34,393	458,556			8,050	178,865	42,443	637,421
1893.	46,472	553,408			9,475	236,875	55,947	790,283
1894.	41,344	449,533			8,623	196,914	49,967	646,447
1895.	35,192	417,083			7,262	169,653	42,454	586,736
1896.	32,351	400,829	28,302	368,942	6,615	154,358	67,268	924,129
1897.	22,500	230,000	26,115	291,466	9,392	217,235	58,007	738,701
1898.	21,627	221,677	48,253	530,789	7,135	159,929	77,015	912,395
1899.	31,100	404,300	64,749	808,157	7,094	164,849	102,943	1,377,306
1900.	28,133	421,995	62,387	938,725	6,055	140,978	96,575	1,501,698
1901.	151,130	1,764,017	116,371	1,599,413	6,875	149,493	274,376	3,512,923
1902.	237,244	2,477,767	112,688	1,584,273	7,970	181,501	357,902	4,243,541
1903.	201,246	2,186,273	87,004	1,345,464	9,635	210,973	297,885	3,742,710
1904.	164,488	1,700,130	127,845	1,746,126	11,121	241,729	303,454	3,687,985
1905.	261,014	2,440,722	256,704	3,868,197	7,588	166,267	525,306	6,475,186
1906.	315,008	3,439,217	275,558	4,338,275	7,845	177,644	598,411	7,955,136
1907.	366,456	4,211,913	275,459	4,581,309	10,447	232,004	651,962	9,125,226
1908.	352,642	3,554,540	271,484	4,385,271	6,709	171,383	630,835	8,111,194
1909.	345,380	3,453,800	407,012	6,002,441	4,770	125,623	757,162	9,581,864
1910.	350,287	4,203,444	447,273	6,956,923	3,237	85,255	800,797	11,245,622
1911.	390,242	4,682,904	526,635	7,606,939	658	17,282	917,535	12,307,125
1912.	424,994	6,374,910	589,593	8,176,089			1,014,587	14,550,999
1913.	480,068	7,201,020	648,899	9,338,992			1,128,967	16,540,012
1914.	227,052	2,951,676	556,112	7,051,180			783,164	10,002,856
1915.	420,275	5,463,575	493,500	5,910,624			913,775	11,374,199
1916.	470,055	7,050,825	699,202	9,700,073			1,169,257	16,750,898
1917.	472,147	10,387,234	698,333	14,638,726			1,170,480	25,025,960

Annual Production of Pig-Iron by Grades, and by Fuels.

In Short Tons.

Year.	By Grades.			By Fuels.		Electric.
	Basic.	Bessemer.	Foundry and all other.	Charcoal.	Coke.	
1909	400,921	222,931	133,310	17,003	740,159	
1910	425,400	219,492	155,905	17,164	783,633	
1911	464,221	208,626	244,688	20,759	896,776	
1912	544,534	256,191	213,862	21,701	992,886	
1913	614,845	265,685	243,437	23,696	1,105,271	
1914	346,553	230,817	205,794	9,380	773,784	
1915	739,613	29,052	145,110	13,692	900,083	
1916	953,627	31,388	184,242	17,304	1,151,953	
1917	961,656	27,783	181,041	14,092	1,142,697	13,691

Monthly Prices of Foundry Pig-Iron at Montreal.*

	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
January.....	21 00	18 00	18 50	21 00	19 75	22 00	19 75	19 35	23 50	28 00
February.....	21 00	18 00	18 50	21 00	19 00	22 00	19 75	19 35	23 50	28 30
March.....	22 00	18 00	18 50	21 00	19 00	22 00	19 75	20 10	24 00	28 30
April.....	20 00	18 00	19 00	21 00	18 50	22 00	19 75	19 90	25 00	30 35
May.....	19 00	18 75	19 00	19 25	18 50	22 00	19 75	19 90	25 00	40 45
June.....	18 75	8 75	18 50	19 25	18 50	21 50	19 75	19 90	25 00	40 50
July.....	18 75	18 50	18 50	19 25	18 50	20 50	19 50	19 90	25 00	40 50
August.....	18 00	18 50	18 00	19 25	19 00	20 50	19 50	19 90	25 00	**
September.....	18 00	18 50	18 00	19 25	20 00	20 50	19 50	20 00	25 00	**
October.....	17 75	19 00	21 00	19 25	20 50	20 50	19 50	20 00	25 00	**
November.....	18 00	19 00	21 00	19 25	20 50	19 75	19 40	21 00	25 00	**
December.....	18 25	19 00	21 00	19 25	21 50	19 75	19 40	22 00	28 00	**
Average.....	19 21	18 50	19 13	19 83	19 44	21 17	19 61	20 10	24 92	

* No. 1 Foundry Pig-iron, f.o.b. cars Montreal, price per ton of 2,240 pounds on the opening market-day of each month. Quotation furnished by the Dominion Iron & Steel Co., Ltd.

** No quotation.

Average Monthly Prices of Bessemer Pig-Iron at Pittsburgh.*

Per Gross Ton (2,240 Pounds).

	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917
	\$	\$	\$	\$	\$	\$	\$	\$		\$
January.....	19 00	17.34	19.90	15.90	15.05	18.15	14.96	14.59	21.58	35.95
February.....	17.90	16.78	19.34	15.90	15.90	18.15	15.09	14.55	21.51	35.95
March.....	17.86	16.25	18.60	15.90	15.09	18.15	15.09	14.55	21.75	37.70
April.....	17.49	15.78	18.27	15.90	15.15	17.90	14.90	14.55	21.95	42.20
May.....	16.93	15.84	17.52	15.90	15.13	17.70	14.90	14.59	21.95	45.15
June.....	16.90	16 05	16.60	15.90	15.15	17 14	14.90	14.70	21.95	54.70
July.....	16.83	16 46	16.40	15.90	15.20	16.70	14.90	14.95	21.95	57.45
August.....	16.23	17.03	16.09	15.90	15.46	16.52	14.90	15.95	21.95	54.75
September.....	15.90	18.05	15.90	15.90	16 15	16 65	14.90	16.85	22.26	48.03
October.....	15.71	19.53	15.90	15.44	17.80	16 60	14.84	16.95	24.08	37.25
November.....	16.59	19.90	15.82	15.00	18.02	16.02	14.59	17.51	30.15	37.25
December.....	17.40	19.90	15.90	15.03	18.15	15.77	14.70	19.65	35.58	37.25

* From the *Iron Age*.

Average Monthly Price of Local No. 2 Foundry Pig-Iron at Chicago.*

(At Furnace) per Gross Ton (2,240 Lbs.).

	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
January.....	18.45	17.35	19.00	15.50	14.00	17.90	13.75	13.00	18.50	30.00
February.....	18.16	16.75	19.00	15.50	14.00	17.31	14.00	13.00	18.50	32.00
March.....	17.85	16.50	18.30	15.50	14.00	17.25	14.25	12.95	18.70	36.00
April.....	17.73	16.50	17.50	15.00	14.00	17.00	14.25	13.00	19.00	39.25
May.....	17.63	16.50	17.06	15.00	14.50	16.00	14.06	13.00	19.00	43.80
June.....	17.73	16.50	16.75	15.00	14.50	15.62	13.69	13.00	19.00	51.00
July.....	17.55	17.00	16.56	14.87	14.70	14.70	13.75	13.00	19.00	55.00
August.....	17.35	17.13	16.50	14.50	15.37	15.00	13.69	13.44	18.40	55.00
September.....	17.05	18.70	16.40	14.50	16.00	15.00	13.25	13.90	18.13	54.67
October.....	16.85	19.00	16.06	14.46	17.00	15.00	12.94	14.63	19.63	33.00
November.....	17.10	19.00	16.00	14.09	17.75	14.87	12.56	17.13	25.80	33.00
December.....	17.35	17.00	16.00	14.00	18.00	14.60	13.00	18.10	29.50	33.00

* From the *Iron Age*, New York.

The quantities of ores, fuels and flux charged to blast furnaces during the past ten years is shown in the following table. In 1917 about 95.8 per cent of the ore charged, 53.3 per cent of the coke, and a large proportion of the limestone, were imported. Previous to 1896 the entire Canadian pig-iron production was from Canadian ores but since that date increasing quantities of imported pig-iron have been used.

The iron industry at Sydney and North Sydney has been built up on the basis of the Newfoundland Wabana ores and the local coal supply, while in recent years a portion of the limestone required has also been obtained from Port au Port, Newfoundland. In Nova Scotia, therefore, while the fuel is all domestic, the ore is practically all imported, though from a British colony.

In Ontario large quantities of United States "Lake ores" are used. All the fuel used, with the exception of a small quantity of charcoal, is imported either as coke, or as coal for charging the by-product coke ovens at Sault Ste. Marie. A portion of the limestone flux is also obtained from quarries situated in the United States. In 1917, Ontario furnaces used 1,210,097 tons of imported ores and 92,065 tons of Canadian ores, the percentage being 93 per cent imported and 7 per cent Canadian. In 1916, 1,050,404 tons of imported ore, or 82.6 per cent of the total and 221,273 tons of Canadian ores, or 17.4 per cent of the total were charged. In 1915, 623,094 tons of imported ore, or 68 per cent of the total, and 293,305 tons or 32 per cent of Canadian ores were charged.

Iron Ore, Fuel, and Flux charged to Blast Furnaces.

Calendar Year.	Iron Ore charged.		Fuel charged.			Limestone.
	Canadian.	Imported.	Charcoal.	Coke from Canadian Coal.	Coke Imported or made from Imported Coal.	
	Short tons.	Short tons.	Bushels.	Short tons.	Short tons.	Short tons.
1908.....	209,266	1,051,445	1,121,990	492,076	325,670	483,065
1909.....	231,994	1,235,000	1,779,258	412,016	507,255	526,076
1910.....	149,505	1,377,035	1,615,919	491,281	476,838	569,355
1911.....	67,434	1,628,368	1,960,459	543,933	577,388	625,216
1912.....	71,588	2,019,165	1,886,748	609,183	656,815	705,613
1913.....	139,436	2,110,828	2,206,191	710,260	706,888	630,119
1914.....	182,964	1,324,326	920,045	330,269	590,902	447,641
1915.....	293,305	1,463,488	1,314,957	578,743	486,022	573,743
1916.....	221,773	1,964,598	1,843,209	712,715	645,488	701,690
1917.....	92,065	2,084,231	1,288,390	634,962	723,657	760,826

IRON BLAST FURNACES IN CANADA IN 1917.

Of 19 furnaces 13 were in blast in 1917 for varying periods of time. The total daily capacity of the 19 furnaces is about 4,835 tons. The operating companies, with numbers and capacities of furnaces, were as follows:—

Dominion Iron & Steel Company, Sydney, C.B.: Six completed furnaces; one of 350 tons capacity and five of 250 tons capacity each per day; three operated throughout the year, one for 261 days and one for 113 days; one furnace idle throughout the year.

Nova Scotia Steel & Coal Co., Ltd., New Glasgow, N.S.: Two stacks and one set of stoves at Sydney Mines, C.B., of 250 tons capacity; operated throughout the year.

Londonderry Iron & Mining Co., Ltd., Londonderry, N.S. (in liquidation); One furnace of 100 tons capacity idle throughout the year, not operated since 1908.

Canada Iron Foundries, Ltd., Montreal, Que.: Two furnaces one of 125 tons, and the other of 250 tons capacity, at Midland, Ont.; both idle throughout the year, not operated since 1913, the larger furnace sold to and removed by the Algoma Steel Corporation, Ltd.

Standard Iron Co., Ltd., Deseronto, Ont.: One furnace at Deseronto with a daily capacity of 65 tons, operated 214 days; one furnace of 65 tons at Parry Sound, idle throughout the year, not operated since 1913.

The Steel Company of Canada, Ltd., Hamilton, Ont.: Two furnaces; one of 260 tons capacity, operated for 295 days, a second furnace of 430 tons capacity operated 360 days.

Algoma Steel Corporation, Ltd., Sault Ste. Marie, Ont.: Three furnaces at Steelton, near Sault Ste. Marie; two of 280 tons capacity each, and one of 500 tons capacity, operated throughout the year. One new 400-ton furnace under construction.

The Atikokan Iron Co., Ltd., Port Arthur, Ont.: One furnace of 175 tons capacity idle throughout the year, not operated since 1911.

The Canadian Furnace Co., Ltd., Port Colborne, Ont.: One furnace of 325 tons capacity operated 357 days in 1916.

ELECTRIC FURNACE PLANTS MAKING PIG-IRON.

Fraser, Brace & Co., Ltd.: Furnace plant at Shawinigan Falls, Que: One single phase 2½-ton furnace, a non-tilting, silicon brick lined shell on a solid foundation.

Canada Cement Company, Ltd., Montréal, Que.: The steel department includes two open-hearth furnaces and four 6-ton electric furnaces of three phase arc type. The electric furnaces were operated on pig-iron during a portion of the year.

Electro Foundries, Ltd., Orillia: One 6-ton three phase type electric furnace.

Wm. Kennedy & Sons, Collingwood: One electric furnace.

Turnbull Electro Metals, Ltd., St. Catharines, Ont.: One 6-ton three phase type electric furnace.

British Forgings, Ltd., Toronto, Ont.: An electric steel furnace plant comprising ten 6-ton Heroult furnaces some of which were used for the production of pig-iron during a portion of 1917.

Tivani Electric Steel Co., Ltd., Belleville, Ont.: This electric steel plant which includes three small furnaces was operated for the production of ferro-molybdenum during 1917, but in March, 1918, began the production of pig-iron.

Aetna Iron and Steel Co., Ltd., Port Moody, B.C.: One 6-ton Heroult electric furnace,—first production in May 1918.

Hull Iron and Steel Foundries, Hull, Que.: One 6-ton three phase tilting type, electric furnace,—first production in April 1918.

Electric Smelting Co. of Brantford, Ltd., Hull, Que.: One 4-ton electric furnace,—first production in June 1918.

FERRO-ALLOY PRODUCTION.

The production of ferro-alloys during 1917, which reached a total of 43,465 tons, valued at \$3,549,814, included ferro-silicon, ferro-molybdenum and ferro-phosphorus made in electric furnaces, a small tonnage of low grade ferro-silicon recovered as a by-product in the manufacture of abrasives from bauxite in electric furnaces and some blast furnace spiegeleisen.

The total production during 1916, which included only ferro-silicon, ferro-molybdenum and ferro-phosphorus made in electric furnaces, was 28,628 tons, valued at \$1,777,615, as against 10,794 tons, valued at \$753,404 in 1915; 7,524 tons, valued at \$478,355 in 1914, and 8,075 tons, valued at \$493,018 in 1913. In 1912 the production was 7,834 tons, valued at \$465,225 and in 1911, 7,507 tons, valued at \$376,404.

FERRO-ALLOY PLANTS IN 1917.

Electro Metals, Ltd., Welland, Ont.: Plant includes 8 electric furnaces producing ferro-silicon of 25 per cent, 50 per cent, 75 per cent, and 85 per cent grades.

Tivani Electric Steel Co., Ltd., Belleville, Ont.: Small electric furnaces comprising three units of two furnaces each making ferro-molybdenum in 1917.

International Molybdenum Co., Ltd., Orillia, Ont.: Two small electric furnaces producing ferro-molybdenum in 1917.

Algoma Steel Corporation, Sault Ste. Marie, Ont.: Producing spiegeleisen in blast furnace.

The following firms were also recovering low grade ferro-silicon as a by-product in the manufacture of artificial abrasives in electric furnaces from bauxite:—

D. A. Brebner, Ltd., Hamilton, Ont.

National Abrasive Co., Hamilton, Ont.

The Exolon Company, Thorold, Ont.

The Norton Company, Chippewa, Ont.

The Canadian Aloxite Co., Niagara Falls, Ont.

Electric furnace plants for the manufacture of 50 per cent ferro-silicon are also under construction in 1918 by,

The Canadian Ferro Alloys, Ltd., at Shawinigan Falls, Que.

The Leaside Munitions, Ltd., at Beaupré, Que.

EXPORTS AND IMPORTS OF PIG-IRON.

The exports of pig-iron during 1917 are reported as 12,081 tons, valued at \$423,814 or an average of \$35.08 per ton, as against exports during 1916 of 23,304 tons, valued at \$374,383, or an average of \$16.07 per ton. The exports of ferro-alloys during the same year were 33,212 tons, valued at \$2,616,924, or an average of \$78.79 per ton, as compared with exports in 1916 of 22,802 tons, valued at \$1,352,013, or an average of \$59.29 per ton.

The total exports of pig-iron and ferro-alloys were thus 45,293 tons, valued at \$3,040,738 in 1917, as against 46,106 tons, valued at \$1,726,396 in 1916.

The exports between 1905 and 1913 did not exceed 10,000 tons in any one year, and consisted largely, if not entirely, of ferro-alloys. During 1914, however, there was a small export of pig-iron, chiefly from Sydney to Philadelphia. The exports during the first three months of the year were 4,431 tons, which probably included about 4,000 tons of pig-iron. From the first of April the exports were separately classified and during the last nine months of the year included 9,767 tons of pig-iron valued at \$118,111, or an average of \$12.09 per ton, and 4,865 tons of ferro-alloys valued at \$285,221, or an average of \$58.63 per ton.

Annual Exports of Pig-Iron and Ferro-alloys, 1915-17.

Calendar Year.	Pig-iron.			Ferro-alloys.		
	Short tons.	Value.	Average value.	Short tons.	Value.	Average value.
1915.....	17,407	\$ 231,551	\$ 13 38	9,238	\$ 537,081	\$ 58.14
1916.....	23,304	374,383	16.07	22,802	1,352,013	59.29
1917.....	12,081	423,814	35.08	33,212	2,616,924	78.79

The imports of pig-iron during 1917 as shown by the Customs reports were 83,390 tons, valued at \$2,763,502, and the imports of ferro-alloys 12,828 tons, valued at \$2,029,990, making a total of 96,218 tons, valued at \$4,793,492. As against this record, however, the United States Department of Commerce shows exports to Canada during the same period of pig-iron and ferro-alloys amounting to 171,147 short tons, valued at \$6,279,651.

The Canadian imports of pig-iron in 1916 were 58,130 tons, valued at \$1,145,150, and of ferro-alloys 14,777 tons, valued at \$1,879,538, or a total of 72,907 tons, valued at \$3,024,688.

Previous to 1907 the annual imports of pig-iron varied from less than 20,000 tons to nearly 100,000 tons per annum. In 1907, however, the imports exceeded 250,000 tons and during each of the years from 1910 to 1913, inclusive, the imports exceeded 200,000 tons.

The annual imports of ferro-alloys during the past few years have varied between 11,000 and 30,000 tons, having reached a maximum in 1913. During 1917 the exports of ferro-alloys were more than double the imports.

Annual Imports of Pig-Iron showing Country of Origin.

Calendar Year.	United States.			Great Britain.			Other Countries.		
	Short tons.	Value.	Value per ton.	Short tons.	Value.	Value per ton.	Short tons.	Value.	Value per ton.
1908.....	26,434	\$ 448,794	\$16 98	30,574	\$ 414,116	\$13 54	335	\$8,705	\$25 99
1909.....	50,167	735,138	14 65	87,394	1,055,799	12 08	364	7,255	19 93
1910.....	107,984	1,516,685	14 05	119,678	1,603,951	13 40	91	2,059	22 63
1911.....	122,360	1,552,896	12 69	86,125	1,055,078	12 29	2	15	7 50
1912.....	210,756	2,599,117	12 33	61,809	912,482	14 76			
1913.....	213,969	2,888,974	13 50	22,800	358,431	15 72			
1914.....	69,254	862,598	12 46	9,426	119,591	12 68			
1915.....	46,894	615,268	13 12	588	8,932	15 19			
1916.....	57,256	1,129,799	19 73	594	10,614	17 87	280	4,737	16 91
1917*.....									

*Destinations not reported for 1917.

Annual Imports of Pig-Iron since 1907.

Year.	Pig-iron.			Charcoal Pig-iron.			Total.	
	Short tons.	Value.	Average value.	Short tons.	Value.	Average value.	Short tons.	Value.
		\$	\$		\$	\$		\$
1907.....	249,582	4,117,887	16 50	2,062	41,806	20 27	251,644	4,159,693
1908.....	57,343	871,615	15 20	1,022	18,818	18 41	58,365	890,433
1909.....	137,925	1,798,192	13 04	413	5,727	13 87	138,388	1,803,919
1910.....	227,753	3,122,695	13 71	16,106	242,152	15 03	243,859	3,364,847
1911.....	208,487	2,610,989	12 52				208,487	2,610,989
1912.....	272,565	3,511,599	12 88	115	1,370	11 91	272,680	3,512,969
1913.....	235,843	3,234,877	13 72	926	12,528	13 53	236,769	3,247,405
1914.....	78,594	981,107	12 48	86	1,082	12 58	78,680	982,189
1915.....	47,482	624,200	13 15				47,482	624,200
1916.....	57,337	1,128,557	19 68	793	16,593	20 92	58,130	1,145,150
1917.....	82,758	2,744,055	33 16	632	19,447	30 77	83,390	2,763,502

Imports of Ferro-alloys, 1916 and 1917.

	1916.			1917.		
	Tons.	Value.	Value per ton.	Tons.	Value.	Value per ton.
		\$	\$ cts.		\$	\$ cts.
Ferro-silicon containing not more than 15% silicon.	1,563.7	41,456	26 51	1,243.3	50,067	40 27
Ferro-silicon containing more than 15% silicon.	7.9	835	105 70	7.6	2,126	279 73
Spiegeleisen and ferro-manganese containing over 15% manganese.	12,658.0	1,399,660	110 58	10,872.0	1,430,091	131 54
Spiegeleisen and ferro-manganese containing not more than 15% manganese and other ferro-products, n.o.p.	547.4	437,587	799 39	705.6	547,706	776 23
	14,777.0	1,879,538	.....	12,828.5	2,029,990	.....

Imports of Ferro-Manganese, Ferro-Silicon, etc.

Calendar year.	Short tons.	Value.	Average value.	Calendar year.	Short tons.	Value.	Average value.
		\$	\$ cts.			\$	\$ cts.
1907	15,437	536,285	34 74	1913	30,355	990,443	30 98
1908	11,718	401,761	34 29	1914	22,147	549,485	27 81
1909	17,699	411,536	23 25	1915	13,758	807,312	58 68
1910	18,900	464,741	24 59	1916	14,777	1,879,538	127 19
1911	17,226	429,458	24 93	1917	12,828	2,029,990	158 25
1912	19,810	469,884	23 72				

CONSUMPTION OF PIG-IRON AND FERRO-ALLOYS.

The total quantity of pig-iron and ferro-alloys used in Canada arrived at by adding to the production the excess of imports over exports amounted in 1917 to 1,264,870 tons, as against 1,224,686 tons in 1916, and 959,254 tons in 1915. Of the total amount consumed in 1917, 1,146,861 tons are reported as having been used in steel furnaces, leaving 118,009 tons of iron available for foundry and other uses. The consumption in steel furnaces included 1,112,082 tons of pig-iron and 34,779 tons of ferro-alloys.

The annual consumption since 1910 compiled upon the same basis is shown in the following table:—

Consumption of Pig-Iron and Ferro-alloys.

Year.	Used in steel furnaces.		Available for foundry and other uses.	Total consumption.* Short tons.
	Pig-iron.	Ferro-alloys.		
1910	690,913	8,143	361,914	1,060,970
1911	700,679	21,359	422,847	1,144,885
1912	735,559	24,237	548,024	1,307,820
1913	913,722	29,408	454,710	1,397,840
1914	619,030	20,252	233,170	872,452
1915	748,114	13,941	197,199	959,254
1916	949,444	25,940	249,302	1,224,686
1917	1,112,082	34,779	118,009	1,264,870

* Production of pig-iron and ferro alloys plus excess of imports over exports.

STEEL.

The production of steel during 1917 has been reported from 27 separate plants (including 8 electric furnace plants), operated by 24 companies.

The total production of steel ingots and castings during the year was 1,745,734 short tons, as compared with 1,428,249 tons in 1916 and 1,020,896 tons in 1915. The increase in 1917 over 1916 was 317,485 tons or over 22 per cent as against an increase in 1916 over the previous year of nearly 40 per cent.

The 1917 production included, open-hearth steel, 1,685,715 tons; electric steel, 50,467 tons; crucible and converter steels, 9,552 tons. In 1916 the open-hearth production was 1,400,883 tons; electric steel, 19,639 tons; Bessemer, crucible and other steels, 7,727 tons.

The production of electric steel in 1915 was 5,625 tons, and in 1914, the first year for which a production was reported, 61 tons.

Statistics of the production of steel ingots and castings since 1894 are given in the following table, the figures for 1894 to 1906, inclusive, having been collected and published by the American Iron and Steel Association; those for the years 1907 to 1916 have been collected by this Department.

Annual Production of Steel Ingots and Castings.

(In short tons).

Year.	Steel Ingots.				Steel Castings.			Total ingots and castings.
	Open- hearth.	Bessemer.	Electric and other steels.	Total ingots.	Open- hearth.	Electric and other steels.	Total castings.	
1894.....								28,767
1895.....								19,040
1896.....								17,920
1897.....								20,608
1898.....								24,125
1899.....								24,640
1900.....								26,406
1901.....								29,214
1902.....				197,959			5,922	203,881
1903.....				198,249			5,047	203,296
1904.....				159,352			7,286	166,638
1905.....				441,342			10,521	451,863
1906.....				622,623			16,773	639,396
1907.....	459,240	225,989		685,229	20,602	1,151	21,753	706,982
1908.....	443,442	135,557		578,999	9,051	713	9,764	588,763
1909.....	535,988	203,715		739,703	14,013	1,003	15,016	754,719
1910.....	580,932	222,668		803,600	18,085	599	18,684	822,284
1911.....	651,676	209,817		861,493	20,163	740	20,903	882,396
1912.....	692,256	231,044		923,280	31,845	2,556	34,401	957,681
1913.....	824,818	301,932		1,126,750	39,217	3,026	42,243	1,168,993
1914.....	608,383	203,184		811,567	15,315	1,759	17,074	828,641
1915.....	962,411	19,448	7,970	989,829	28,384	2,683	31,067	1,020,896
1916.....	1,377,387	1,416	18,900	1,397,703	23,496	7,050	30,546	1,428,249
1917.....	1,642,085		49,206	1,691,291	43,630	10,813	54,443	1,745,734

Materials charged to Steel Furnaces.—The total quantity of pig-iron used in steel furnaces during 1917 was 1,112,082 tons, of which 993,805 tons were produced by the firms reporting, and 118,277 tons purchased. The quantity of ferro-alloys used was 34,779 tons. The total quantity of scrap iron and steel used was 1,022,456 tons, of which 527,400 tons originated with the firms reporting, and 495,056 tons were reported as purchased. Ores used included 2,726 tons of manganese ore and 39,793 tons of iron ore, while 231,563 tons of limestone and dolomite were used, and 17,084 tons of fluorspar. In Ontario, about 1,188 million cubic feet of natural gas were used, while in Nova Scotia coke-oven gas was used at Sydney, of which a record of quantity was not obtained.

A record of materials used in steel furnaces covering the past eight years is shown in the following table:—

Pig-Iron, Scrap Iron, and other Materials Charged to Steel Furnaces.

(In short tons).

Year.	Pig-iron.	Ferro-alloys.	Scrap Iron and Steel.	Iron Ore.	Manganese Ore.	Fluorspar.	Limestone and Dolomite.
1910.....	690,913	8,143	211,453	39,332	1,317	7,461	144,110
1911.....	700,769	21,359	278,797	42,892	829	8,067	130,270
1912.....	735,559	24,237	336,265	43,006	985	9,709	148,045
1913.....	913,722	29,408	406,403	55,018	1,342	10,687	197,028
1914.....	619,030	20,252	286,863	37,686	723	7,845	114,859
1915.....	748,114	13,941	413,266	74,872	908	13,520	252,045
1916.....	949,444	25,940	469,162	55,059	1,578	13,213	224,772
1917.....	1,112,082	34,779	1,022,456	39,793	2,726	17,084	231,563

It will be noted that there is a large consumption of scrap iron and steel in the manufacture of steel ingots and castings. For each 100 tons of pig-iron used in 1917 the quantity of scrap charged was 91 tons. In 1916, 71.5 tons of scrap iron were used to each 100 tons of pig-iron and in the two preceding years the ratios were 55.2 tons and 46.3 tons respectively.

The exports of scrap iron and steel in 1917 are shown by the customs reports as 176,571 tons, valued at \$2,300,022, or an average of \$13.02 per ton, as against exports of 114,300 tons, valued at \$1,357,018, or an average of \$11.87 per ton in 1916, and 89,358 tons, valued at \$883,134, or an average of \$9.88 per ton in 1915.

From 1900 to 1912 the annual exports of scrap varied considerably, the lowest being 4,208 tons in 1911 and the highest 24,109 tons in 1905. During the past five years the exports have increased very rapidly.

The total imports of scrap iron and scrap steel in 1917 are reported as 20,654 tons, valued at \$454,079, or an average of \$21.98 per ton, as against imports in 1916 of 11,574 tons, valued at \$179,751, or an average of \$15.53 per ton, and imports in 1915 of 11,477 tons, valued at \$127,614, or an average of \$11.12 per ton. In 1913 the imports exceeded 100,000 tons and during the preceding 20 years the imports varied from 8,000 tons to 70,000 tons per annum.

Tabulated records of the exports and imports of scrap iron and steel were published in the report on production of iron and steel, 1916.

Rolling Mill Production.—Statistics of the production of rolled iron and steel products have been received from all firms operating rolling mills in Canada. The principal rolled products are, in addition to blooms and billets, steel rails, wire rods, bars and rods, and a small tonnage of plates and structural steel. In addition to rolled products there are also manufactured at some of these plants, forgings, angle splice bars, rail fastenings, nails and spikes, wire and wire fencing, and many other classes of finished iron and steel products, a detailed record of which is not obtained.

The quantity of steel used by rolling mills in 1917 included 1,503,599 tons of ingot produced by firms reporting, 49,680 tons of ingots, blooms, billets, and plates, purchased, and 125,554 tons of scrap iron and steel. In 1916 the quantity of steel used by rolling mills included 1,360,797 tons of ingots produced by firms reporting 83,090 tons of ingots, blooms, and billets purchased, and 130,734 tons of scrap iron and steel. In 1915 the quantities of steel used included 1,033,682 tons of ingots produced by firms reporting 21,975 tons of ingots, blooms and billets purchased, and 57,051 tons of scrap iron and steel.

The production in 1917 included: Steel rails, 46,645 tons; wire rods, 195,392 tons; bars, plates and structural steel, 631,389 tons; forged products, 87,155 tons. The production in 1916 included: Steel rails, 90,123 tons; wire rods, 179,226 tons; bars and plates, 619,500 tons; forged products, etc., 152,668 tons. The production in

1915 included: Steel rails, 232,411 tons; wire rods, 124,381 tons; bars and plates, 294,595 tons; forged products, etc., 34,358 tons. In addition to the above there was also a small production of billets for export.

The annual production of rolling mills in so far as returns have been furnished to this Department, are as follows:—

Annual Production of Rolling Mills.

(In short tons).

Year.	Steel Rails.	Wire Rods.	Bars and Plates.	Other Products.*
1908.....	300,935	41,420		
1909.....	377,642	81,762		
1910.....	399,762	88,456	128,940	28,354
1911.....	399,760	85,811	202,023	62,676
1912.....	471,422	68,174	267,797	36,441
1913.....	554,481	57,389	269,096	51,654
1914.....	428,226	63,856	143,754	42,070
1915.....	232,411	124,381	294,595	34,358
1916.....	90,123	179,296	619,500	152,668
1917.....	46,645	195,392	631,389	87,155

* Includes forged products, angle splice bars, and rail fastenings.

Steel Billets.—A record of monthly prices of mild steel billets at Montreal as quoted by the Dominion Iron and Steel Company, is shown in an accompanying table.¹

During 1916 prices steadily increased during the year, quotations in January and February being from \$38.50 to \$40.50 per gross ton and in December from \$52 to \$55 per gross ton. In April of 1917 the price was increased to \$60 and for the last eight months of the year, quotations are not recorded.

In Pittsburgh, open-hearth billets averaged \$32 per gross ton in January, 1916, increasing to \$45 in April and May. There was a slight decrease during the next three months followed by further increases to a maximum monthly average of \$57.50 in December. In 1917 prices continued to increase, reaching a maximum of \$100 in July. A fixed maximum of \$47.50 came into full effect in November.

Monthly Prices of Mild Steel Billets at Montreal.*

	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
January	30 00	26 00	26 50	27 00	24 75	26 50	24 50	24 75	39 50	53 50
February	30 75	26 00	26 50	27 00	23 75	30 00	24 50	24 75	39 50	53 50
March	31 00	26 25	26 50	27 00	23 75	30 00	24 50	26 50	45 50	53 50
April	30 75	26 25	26 50	27 00	23 75	30 00	25 25	26 50	44 50	60 00
May	31 75	26 25	26 50	26 75	23 75	31 00	25 25	26 50	44 50	
June	33 75	26 50	26 00	25 75	23 75	31 00	25 25	26 50	44 50	* *
July	26 75	26 50	26 00	25 75	23 75	29 00	25 25	26 50	44 50	
August	27 00	26 50	25 75	25 00	24 25	29 00	25 25	29 50	44 50	
September	27 00	26 25	25 50	25 00	24 75	28 00	25 25	31 00	44 50	
October	27 25	26 25	25 50	23 75	25 25	26 50	25 25	31 00	46 00	
November	27 00	26 25	24 75	23 75	25 25	25 50	24 75	32 00	52 00	
December	26 75	26 50	25 00	24 75	26 00	25 50	24 75	34 00	53 50	
Average	29 15	26 29	25 91	25 71	24 40	28 50	25 23	28 29	45 08	

*Average price per ton of 2,240 pounds, f.o.b. Montreal in the first week of each month, quotations supplied by the Dominion Iron & Steel Co., Ltd.

**No quotations.

¹ Compiled from the annual records of wholesale prices published by the Department of Labour.

Average Monthly Prices of Bessemer Steel Billets at Pittsburgh.*

	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
January.....	28 00	25 00	27 50	23 00	20 00	28 30	20 13	19 25	32 00	63 00
February.....	28 00	25 00	27 50	23 00	20 00	28 50	21 00	19 50	33 50	65 00
March.....	28 00	23 00	27 50	23 00	19 75	28 50	21 00	19 70	42 40	66 25
April.....	28 00	23 00	26 75	23 00	20 00	28 50	20 80	20 00	45 00	73 75
May.....	28 00	23 00	26 12	22 60	20 80	27 37	20 00	20 00	45 00	86 00
June.....	25 75	23 00	25 30	21 00	20 87	26 50	19 50	20 50	43 50	98 75
July.....	25 00	23 50	25 00	21 00	21 50	26 60	19 00	21 38	41 00	100 00
August.....	25 00	24 13	24 62	21 00	22 12	26 00	20 25	23 13	44 20	86 00
September.....	25 00	25 00	24 40	20 75	23 62	24 87	21 00	24 16	45 00	66 25
October.....	25 00	26 25	23 75	20 00	26 00	23 30	20 00	24 63	46 25	49 38
November.....	25 00	27 13	23 30	19 50	27 00	21 00	19 25	26 50	52 00	47 50
December.....	25 00	27 50	23 00	19 25	27 00	20 00	19 00	30 60	57 50	47 50

*As compiled and published by "The Iron Age," New York.

The Dominion Iron and Steel Company has, during the past three years, been making some export of steel billets for European demand. The exports are separately reported by the Customs Department since April, 1917, and the total exports of billets, ingots, and blooms during the nine months ending December, 1917, were 41,558 tons valued at \$1,831,917, or an average of \$44.08 per ton. There was also an export of bars and rods during the same period of 41,321 tons valued at \$3,633,787, or an average of \$87.94 per ton.

There has been a considerable annual importation as shown in the accompanying tables of iron and steel billets, and of iron and steel ingots, blooms, slabs, puddled bars, etc. The export records of the United States appear to show considerably larger exports of these products to Canada than is included in the Canadian record, a difference which may be due to the inclusion in the Canadian record of considerable quantities of material free of duty for the use of the Imperial Government.

According to the United States record¹ there was exported from the United States to Canada during the calendar year 1917, billets, ingots and blooms of steel, 150,533 gross tons (168,597 short tons), valued at \$11,962,280, or an average of \$70.95 per short ton, as against 105,260 gross tons (117,891 short tons), valued at \$6,657,538, or an average of \$56.43 per short ton, in 1916, and 53,486 gross tons (65,504 short tons), valued at \$1,528,155, or an average of \$23.33 per short ton, in 1915.

The second table following shows for a number of years the exports of billets, ingots and blooms of steel to Canada. The principal differences between this and the Canadian record appears to be for the years 1916 and 1917. There is shown in this table also a record of the exports from the United States to Canada of steel rails, sheets and plates, structural iron and steel, tin plate, etc., wire and manufactures of wire, pipe and fittings, and metal-working machinery.

¹ Monthly Summary of Foreign Commerce of the United States, Department of Commerce, Washington, D.C.

Imports of Iron and Steel Ingots, Blooms, Billets, etc.

Fiscal Year.	Iron and steel billets weighing not less than 60 pounds per lineal yard.			Iron or steel ingots, coggled ingots, blooms, slabs, puddled bars and loops, or other forms, n.o.p., less finished than iron or steel bars, but more advanced than pig-iron, except castings.			Steel billets, n.o.p.			Total.	
	Short tons.	Value.	Per ton.	Short tons.	Value.	Per ton.	Short tons.	Value.	Per ton.	Short tons.	Value.
		\$	\$ cts.		\$	\$ cts.		\$	\$ cts.		\$
1908	14,866	416,163	27 99	4,722	135,177	28 63	1,634	48,672	29 79	21,222	600,012
1909	3,940	95,350	24 20	3,715	53,135	14 30	1,232	31,869	25 86	8,887	180,354
1910	28,358	518,102	18 27	5,775	97,333	16 85	2,682	63,089	23 52	36,815	678,524
1911	44,457	861,036	19 37	3,228	68,616	21 26	711	19,940	28 03	48,306	947,392
1912	85,852	1,593,665	18 56	2,608	52,063	19 97	729	17,242	23 65	89,189	1,652,970
Calendar Year											
1913	51,765	1,178,151	22 76	665	19,379	29 61	453	14,784	32 67	52,873	1,212,314
1914	12,247	241,234	19 70	155	3,348	21 65	647	15,121	23 57	13,019	259,703
1915	32,210	715,493	22 21	10,980	316,814	28 85	10,928	238,380	21 81	54,118	1,270,687
1916*	12,627	485,625	39 25	7,946	385,816	47 29	303	14,005	46 24	20,876	895,446
1917*	10,186	663,668	65 15	10,443	714,908	69 79	348	22,573	64 83	90,777	1,401,149

* Import record not complete. See explanation in text.

Exports of Various Iron and Steel Products from the United States to Canada.

Calendar Year.	Billets, Ingots and Blooms of Steel.			Steel Rails for Railways.			Sheets and Plates.			Structural Iron and Steel.		
	Short tons.	Value.		Short tons.	Value.		Short tons.	Value.		Short tons.	Value.	
		\$	\$ cts.		\$	\$ cts.		\$	\$ cts.		\$	\$ cts.
1910.	23,160	461,204	19 91	28,382	750,424	26 44	.....	.....	.....	83,838	2,346,393	39 91
1911.	64,020	1,262,732	19 72	98,613	2,499,110	25 34	.....	.....	.....	115,420	4,113,858	35 64
1912.	92,976	1,941,015	20 88	149,353	3,799,685	25 44	.....	.....	.....	190,346	6,823,072	35 85
1913.	45,568	964,373	21 16	181,408	4,731,539	26 41	.....	.....	.....	322,766	10,463,154	32 42
1914.	16,044	311,267	19 40	25,949	685,468	26 42	356,344	12,864,721	34 70	125,451	3,454,372	27 53
1915.	65,504	1,528,155	23 33	8,521	280,637	27 07	207,203	6,855,494	33 09	110,725	3,063,362	27 67
1916.	117,891	6,657,538	56 43	46,011	1,586,639	34 48	223,715	7,781,270	34 78	125,169	5,788,908	46 25
1917.	168,597	11,962,280	70 95	54,088	1,815,768	33 57	256,948	25,451,608	99 05	131,383	9,235,063	70 29

Calendar Year.	Tin Plate, Teme Plates and Taggers Tin.			Wire.			Pipe and Fittings.			Metal Working Machinery.		
	Short tons.	Value.		Short tons.	Value.		Short tons.	Value.		Value.		
		\$	\$ cts.		\$	\$ cts.		\$	\$ cts.			
1910.	12,473	881,719	70 69	47,074	2,077,092	44 12	30,008	1,371,399	45 70	.....	466,216	.....
1911.	32,095	2,243,492	69 90	62,895	2,670,765	42 46	40,485	1,853,764	45 79	.....	1,083,718	.....
1912.	52,746	3,662,770	69 44	64,354	2,496,781	38 80	86,103	4,288,887	49 81	.....	1,885,241	.....
1913.	51,524	3,842,159	74 57	53,749	2,143,449	39 88	79,929	4,093,699	51 22	.....	1,888,463	.....
1914.	39,770	2,614,859	65 75	53,259	2,083,150	39 12	.....	.....	.....	.....	767,064	.....
1915.	43,854	2,762,405	62 99	51,963	2,159,436	41 56	15,374	954,817	62 10	.....	4,336,065	.....
1916.	57,633	4,694,005	81 45	66,690	4,289,572	64 32	21,859	1,697,511	77 66	.....	7,929,989	.....
1917.	66,329	9,160,783	138 11	54,447	4,456,353	81 84	22,333	2,524,362	113 03	.....	5,542,853	.....

Steel Rails.—The production of steel rails in Canada during 1917 was 46,645 short tons, as against 90,123 short tons in 1916, and 232,411 short tons in 1915. The annual production from 1905 to 1915 varied between 200,000 tons and 500,000 per annum.

The exports of steel rails during the nine months ending December 31, 1917, were 26,402 tons, valued at \$1,605,742, or an average of \$60.82 per ton. Previous to April 1, 1917, the exports of rails were not separately classified, although during the past three years shipments have been made to South Africa and the United States. The imports of steel rails as recorded in the Customs reports were 18,160 tons, valued at \$689,197. The United States exports to Canada during the same period, however, are reported as 54,088 short tons, valued at \$1,815,768, or an average of \$33.57 per ton.

The annual imports of steel rails from 1895 to 1905 ranged between 50,000 tons and 212,000 tons, averaging about 125,000 tons. From 1906 to date, however, or since the establishment of the rail mills at Sydney and Sault Ste. Marie, the imports have fallen to an annual average of about 60,000 tons, the variation being between a minimum of 10,420 tons in 1915 and a maximum of 177,041 tons in 1913.

Wire rods.—The production of wire rods in Canadian rolling mills in 1917 was 195,392 tons as compared with 179,226 tons in 1916, and 124,381 tons in 1915. From 1908 to 1914 inclusive, the average annual production was about 70,000 tons. The imports of wire rods in the coil in 1917 were 55,314 tons valued at \$3,536,504, or an average of \$63.93 per ton as compared with imports in 1916 of 66,166 tons valued at \$3,069,162, or an average of \$46.39 per ton. The annual imports have varied between rather wide limits having been as high as 55,000 tons in 1902 and less than 10,000 tons in 1908, the highest import having been reached during the fiscal year of 1913 with a total of 91,919 tons.

The average monthly price of wire rods in Pittsburgh in 1917 rose from \$75 in January to a maximum of \$96.25 in August. Quotations were then shaded off to the Government fixed price of \$57 which received approval on October 11, 1917.

Annual Imports of Wire Rods.*

Calendar Year.	Short Tons.	Value.	Value per Ton.	Calendar Year.	Short Tons.	Value.	Value per Ton.
		\$	\$ cts.			\$	\$ cts.
1913.....	79,608	1,962,235	24 65	1916.....	66,166	3,069,162	46 39
1914.....	65,250	1,472,597	22 57	1917.....	55,314	3,536,504	63 93
1915.....	71,839	1,695,842	23 60				

* Rolled iron wire rods in the coil of iron or steel not over $\frac{3}{8}$ inch in diameter when imported by wire manufacturers for use in making wire in the coil in their own factories.

Rolled round rods in the coil of iron or steel for the manufacture of chains.

Average Monthly Prices of Bessemer Wire Rods at Pittsburgh.*

	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
January	34 30	33 00	33 00	28 60	24 37 $\frac{1}{2}$	30 00	25 50	25 00	43 00	75 00
February	35 00	33 00	33 00	28 75	25 00	30 00	26 38	25 00	48 00	.....
March.....	35 00	33 00	33 00	29 00	25 00	30 00	26 50	25 00	54 80	81 00
April.....	35 00	29 00	32 50	29 00	25 00	30 00	26 00	25 00	60 00	85 00
May.....	35 00	27 50	32 00	29 00	25 00	30 00	25 50	25 00	60 00	86 00
June.....	33 50	27 50	30 80	28 25	25 00	29 50	24 50	25 00	53 75	92 50
July.....	33 00	29 40	29 20	27 00	25 00	28 30	24 50	25 63	55 75	96 25
August.....	33 25	31 00	28 25	27 00	25 80	28 00	25 00	27 00	55 00	94 00
September.....	33 00	31 50	28 00	27 00	27 00	27 37 $\frac{1}{2}$	26 20	29 40	55 00	88 75
October.....	33 00	31 87 $\frac{1}{2}$	28 50	26 00	28 50	26 60	25 88	31 75	55 00	77 25
November.....	33 00	32 50	28 12 $\frac{1}{2}$	25 30	29 75	25 87 $\frac{1}{2}$	25 25	36 25	63 00	57 00
December.....	33 00	33 00	28 00	24 50	30 00	25 17	25 00	39 00	68 75	57 00

* As compiled and published by "The Iron Age," New York.

Tin Plate.—There is no production of tin plate in Canada. The imports during 1917 were 66,676 tons valued at \$9,985,631, or an average of \$149.76 per ton as compared with imports in 1916 of 57,543 tons valued at \$5,221,163, or an average of \$90.74 per ton. The imports during the past ten years have averaged about 42,500 tons per annum.

Annual Imports of Tin Plate.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		\$			\$
1909.	36,904	2,216,089	1914.	50,791	3,151,385
1910.	39,101	2,475,010	1915.	45,165	2,883,951
1911.	47,006	3,172,943	1916.	57,543	5,221,163
1912.	60,502	3,826,735	1917.	66,676	9,985,631
1913.	58,031	3,954,615			

EXPORTS AND IMPORTS OF IRON AND STEEL GOODS.

Canada imports large quantities of iron and steel, much larger quantities than are manufactured in domestic steel mills. Reference has already been made to exports and imports of a few specific products; the following, however, is a general summary of the available records relating to exports and imports of iron and steel as compiled from the reports of the Customs Department. Mention has already been made of the fact that some of these records such as imports of billets, steel rails, and pig-iron, are apparently incomplete. It is assumed that considerable quantities of these products have been imported by and for the use of the Imperial Government as munitions of war and entered under a special item of the Customs classification to cover such imports instead of under the usual classification. This fact should be kept in mind in analysing the statistics, since it may explain a number of apparent discrepancies between these records and those available from other sources, such, for instance, as the United States Department of Commerce records of Foreign Trade.

The exports of iron and steel from Canada have consisted chiefly of manufactured goods, such as agricultural implements, automobiles, bicycles, machinery, etc. During the past two years, however, there have been considerable exports of steel rails, billets, rods and wire products.

The total recorded value of iron and steel exported during the calendar year 1917 was \$46,791,681, as compared with a value of exports in 1916 of \$63,958,558 and in 1915 of \$48,268,148.

The exports during 1917 included: Pig-iron and ferro-alloys, 45,293 tons valued at \$3,040,738; scrap iron and steel, 176,571 tons valued at \$2,300,022; wire and wire nails, 105,482 tons valued at \$9,823,700; billets, bars, rods and rails during the last nine months of the year, 109,281 tons valued at \$7,071,446; agricultural implements valued at \$5,430,906; automobiles and bicycles, \$6,711,888; other manufactures of iron and steel, \$12,412,981.

The exports during 1916 included: Pig-iron and ferro-alloys, 46,106 tons valued at \$1,726,396; scrap iron and steel, 114,300 tons valued at \$1,357,018; wire and wire nails, 122,526 tons valued at \$8,597,320; agricultural implements valued at \$3,740,494; automobiles and bicycles, \$6,807,499; other manufactures of iron and steel, \$729,831.

The exports during 1915 included: Pig-iron and ferro-alloys, 26,545 tons valued at \$768,632; scrap iron and steel, 89,358 tons valued at \$883,134; wire and wire nails, 71,998 tons valued at \$3,224,740; agricultural implements valued at \$3,417,060; automobiles and bicycles, \$7,139,712; other manufactures of iron and steel, \$32,834,870.

The exports during 1914 included: Pig-iron and ferro-alloys, 19,063 tons, valued at \$486,366; scrap-iron and steel, 35,405 tons, valued at \$446,337; wire and wire

nails, 9,663 tons, valued at \$355,781; agricultural implements, valued at \$5,788,899; automobiles and bicycles, \$3,409,749; other manufactures of iron and steel, \$3,904,614.

A detailed record of these exports during the last two years is shown in the accompanying table:—

Exports of Iron and Steel Goods, the Products of Canada, during the Calendar Years 1916 and 1917.

		1916.			1917.		
		Quantity.	Value.	Average Value.	Quantity.	Value.	Average Value.
			\$	\$		\$	\$
Stoves	No.		29,956			50,451	
Gas buoys and parts of.....	\$		2,484			85	
Castirgs, n.e.s.	"		167,881			583,297	
Pig-iron	Tons.	23,304	374,383	16.07	12,081	423,814	35.08
Ferro-silicon and ferro-alloys ..	"	22,802	1,352,013	59.29	33,212	2,616,924	78.79
Bars and rods† ..	"				41,321	3,633,787	87.94
Billets, ingots and blooms† ..	"				41,558	1,831,917	44.08
Rails†	"				26,402	1,605,742	60.82
Wire and wire nails.....		122,526	8,957,320	70.17	105,482	9,823,700	93.13
Machinery (linotype machines) \$			35,465			6,977	
Machinery, n.e.s.	\$		1,206,863			2,499,581	
Sewing machines, parts of... \$			82,032			157,809	
Washing machines, etc.	\$		5,763			6,400	
Typewriters.....	No.	3,597	246,761	68.60	1,833	97,904	51.99
Scrap iron and steel.....	Tons.	114,300	1,357,018	11.87	176,591	2,300,022	13.02
Hardware, tools, etc.	\$		376,549			940,347	
Hardware, n.e.s.	\$		515,613			917,177	
Cream separators*.....	\$		34,567			150,923	
All other iron and steel.....	\$		38,974,154			7,000,678	
Agricultural implements—							
Mowing machines.....	No.	6,672	233,024	34.93	12,149	486,593	40.16
Reapers	"	4,115	65,011	58.31	2,771	188,597	68.17
Drills	"	4,712	317,831	67.44	6,240	314,435	50.39
Harvesters and binders ...	"	7,495	814,517	108.67	9,502	1,153,751	121.95
Ploughs	"	17,700	483,650	27.32	25,354	1,150,386	45.37
Harrows	"	6,691	97,214	14.53	4,093	93,609	22.87
Hay rakes	"	2,011	43,746	21.75	4,704	116,395	26.86
Seeders	"	2	128	64.00	26	2,621	100.81
Threshing machines.....	"	1,522	465,209	305.66	1,172	274,764	234.44
Cultivators.....	"	4,219	142,028	33.66	6,336	170,611	26.93
All other	\$		292,603			297,640	
Parts of.....	\$		750,966			1,025,275	
Automobiles.....	No.	12,579	6,078,668	483.24	9,492	4,561,875	480.60
" parts of	\$		672,060			2,035,769	
Bicycles	No.	580	50,894	87.75	454	61,984	136.53
" parts of	\$		5,877			52,260	
Gasoline engines	No.	529	86,310	163.16	800	152,275	190.34
Total			63,958,558			46,791,681	

* 9 months in 1916. † 9 months in 1917.

Annual Exports of Iron and Steel Products since 1909.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	\$		\$		\$
1909*	7,172,413	1912.....	10,682,484	1915.....	48,268,148
1910.....	7,895,489	1913.....	13,999,149	1916.....	63,958,558
1911.....	9,907,281	1914.....	14,391,746	1917.....	46,791,681

* Agricultural implements, automobiles and bicycles included in 1909 and subsequent years.

Separate records, covering a period of years, of the annual exports of pig-iron and ferro-alloys and of scrap iron and steel have already been given on previous pages.

The total value of the imports of iron and steel goods during the calendar year 1917, subject to the explanation already made in respect to certain products not recorded under the usual and regular classification and therefore omitted from this record was \$186,538,538 as compared with a value of \$129,090,241 imported during the calendar year 1916, \$74,308,983 imported during the calendar year 1915, \$80,063,679 imported during 1914, and \$145,226,972 imported during 1913. Previous to 1913 the record is shown covering the fiscal years. During the twelve months ending March, 1913, the imports were valued at \$148,579,272, as against imports valued at \$105,614,450 during the twelve months ending March, 1912.

Between 1895 and 1904, the imports of iron and steel increased from about \$8,600,000 to over \$40,000,000. During the next five years there was comparatively little change, but from 1909 to 1913 the increase was again very rapid. During the latter part of 1913 there was, however, a distinct check to imports with the heavy falling off shown in 1914 and 1915.

The imports during 1917 subject to duty were valued at \$153,743,649, the imports free of duty during the same period being valued at \$32,794,889.

The imports during 1916 subject to duty were valued at \$107,863,317, the imports free of duty during the same period being valued at \$21,226,931. These imports include all classes of manufactured iron and steel goods as well as those of cruder form. In many cases the values only of the imported goods are given, so that a total tonnage of imports cannot be stated. In the case of most of the cruder materials, however, the quantities are given and a compilation of these showing the importation of the cruder forms of iron and steel since 1909 is shown in the accompanying tables.

Thus, during the twelve months ending December 31st, 1916, there was imported 929,776 tons of iron and steel valued at \$84,448,580, or an average of \$90.83 per ton, together with other iron and steel goods, the quantities of which are not stated, valued at \$102,089,958.

During the twelve months ending December, 1916, there were imported 864,916 tons of iron and steel valued at \$52,114,258, or an average of \$60.25 per ton, together with other iron and steel goods of which the quantities are not stated, valued at \$76,975,990.

During the twelve months ending December, 1915, there were imported 771,007 tons of iron and steel valued at \$27,504,685, or an average value per ton of \$35.67, together with other iron and steel goods, the quantities of which are not stated, valued at \$46,804,298.

Summary of Imports of Iron and Steel, 1916 and 1917.

Material.	1916.			1917.		
	Tons.	Value.	Average	Tons.	Value.	Average.
		\$	\$		\$	\$
Pig-iron.....	58,330	1,145,150	19.63	83,416	2,764,165	33.14
Ferro-alloys and chrome steel.....	14,840	1,893,879	127.62	12,886	2,045,595	158.75
Ingots, blooms, billets, puddled bars, etc.....	(b) 20,876	895,446	42.89	(c) 20,778	1,401,782	67.46
Scrap iron and scrap steel.....	11,572	179,751	15.53	20,654	454,079	21.99
Plates and sheets.....	225,439	12,806,096	56.81	185,074	17,582,700	95.00
Tin plates and sheets.....	57,543	5,221,163	90.73	66,676	9,985,631	149.76
Bars, rods, hoops, bands, etc.....	198,652	13,352,807	67.27	228,512	22,567,187	98.76
Structural iron and steel.....	158,905	8,042,127	50.61	185,965	15,282,012	82.18
Rails and connexions.....	14,003	470,023	33.57	22,213	944,595	42.52
Pipe and fittings (a).....	5,399	165,576	30.67	2,348	143,124	60.96
Nails and spikes.....	4,103	283,007	68.98	10,928	892,021	81.63
Wire (a).....	66,115	4,305,674	65.12	51,764	4,409,376	85.18
Forgings, castings and manufactures.....	29,137	3,343,559	114.75	38,562	5,976,313	154.98
Total.....	(b) 864,916	52,114,258	60.25	(c) 929,776	84,448,580	90.83
Other iron and steel products valued at.....		76,975,990			102,089,958	
Total value of imports of iron and steel.....		129,090,248			186,538,538	

(a) There are additional imports of pipe and wire included under "other iron and steel products."

(b) This figure should be increased by nearly 100,000 tons and the value in proportion, because of the imports of steel billets entered under a general classification. See explanation under steel billets, page No. 77.

(c) This figure should be increased by about 150,000 tons. See footnote (b).

Summary of Tonnage of Iron and Steel Imported during Calendar Years 1913-17.

(In short tons.)

Material.	1913.	1914.	1915.	1916.	1917.
Pig-iron.....	236,769	78,680	47,482	58,330	83,416
Ferro-products and chrome steel.....	30,678	22,271	13,905	14,840	12,886
Ingots, blooms, billets, puddled bars, etc.....	52,872	13,049	54,118	(b) 20,876	(c) 20,778
Scrap iron and scrap steel.....	104,747	27,688	11,477	11,574	20,654
Plates and sheets.....	365,675	227,633	224,484	225,439	185,074
Tin plates and sheets.....	58,031	50,791	45,165	57,543	66,676
Bars, rods, hoops, bands, etc.....	277,879	148,368	156,990	198,652	228,512
Structural iron and steel.....	439,871	160,538	126,780	158,905	185,965
Rails and connexions.....	182,421	42,064	12,481	14,003	22,213
Pipe and fittings (a).....	30,663	15,614	4,489	5,399	2,348
Nails and spikes.....	7,584	4,864	1,522	4,103	10,928
Wire (a).....	70,712	66,280	49,529	66,115	51,764
Forgings, castings and manufactures.....	32,604	20,339	22,585	29,137	38,562
Total.....	1,890,506	878,179	771,007	(b) 864,916	(c) 929,776

(a) There are additional imports of pipe and wire included under "other iron and steel products."

(b) (c) See footnotes to previous table.

Summary of Tonnage of Iron and Steel Imported 1909-13.

(In short tons.)

Material.	Twelve Months Ending March.				
	1909.	1910.	1911.	1912.	1913.
Pig-iron	58,591	159,506	270,102	201,112	291,904
Ferro-alloys and chrome steel.....	13,206	15,153	19,182	18,548	23,378
Ingots, blooms, billets, puddled bars, etc.....	8,887	36,819	48,395	89,190	86,745
Scrap iron and scrap steel.....	26,212	28,797	53,824	78,378	103,317
Plates and sheets.....	116,610	200,575	205,690	243,461	376,633
Tin plates and sheets.....	26,859	39,866	44,025	45,802	64,571
Bars, rods, hoops, bands, etc.....	73,261	117,159	183,865	195,139	278,878
Structural iron and steel.....	162,735	195,748	232,585	268,572	377,551
Rails and connexions.....	32,543	55,183	36,690	97,062	156,318
Pipe and fittings.....	18,309	16,705	28,831	26,627	40,987
Nails and spikes.....	1,611	3,476	3,374	7,201	11,420
Wire.....	39,375	68,211	64,850	69,597	80,846
Forgings, castings, and manufactures.....	14,394	18,093	24,523	27,668	47,195
Total.....	592,593	955,291	1,215,936	1,368,357	1,939,743

Annual Imports of Iron and Steel Products since 1895.

Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.
	\$		\$		\$		\$
1895 (a)	8,684,024	1901.....	25,023,453	1907*.....	44,739,403	1913 (b) ...	148,579,272
1896.....	10,206,759	1902.....	31,591,484	1908 (b)....	64,257,238	1913 (c)....	145,226,972
1897.....	11,063,156	1903.....	39,533,867	1909.....	42,075,797	1914.....	80,063,679
1898.....	16,340,992	1904.....	40,449,175	1910.....	62,356,974	1915.....	74,308,983
1899.....	19,463,329	1905.....	40,820,233	1911.....	88,179,152	1916 (c)....	129,090,248
1900.....	27,926,766	1906 (a)....	42,210,305	1912.....	105,614,450	1917.....	186,538,538

*Nine months ending March, 1907.

(a) Twelve months ending June from 1895 to 1906 inclusive.

(b) Twelve months ending March from 1908 to 1913 inclusive.

(c) Twelve months ending December from 1913 to date.

LEAD.

The production of lead in Canada in 1917 amounted to 32,576,281 pounds, valued at \$3,628,020, as compared with 41,497,615 pounds, valued at \$3,532,692, in 1916, a decrease of 21.5 per cent in quantity but an increase of 2.7 per cent in value. In 1916 there had been a decrease of 10.4 per cent in quantity and an increase of 40.0 per cent in value.

The statistics of lead production since 1909 as given in the accompanying table represent the quantity of refined lead produced in Canada from domestic ores, together with a small quantity of lead contained in lead ore or bullion exported. The production has been mainly from British Columbia with occasional small amounts from other provinces and the Yukon Territory.

For a number of years there has been a very wide divergence between the record of lead recovery and the statements of lead contained in ores shipped from the mines. While the difference is due in part to smelter losses, there was also, during 1912 and 1913 especially, a considerable accumulation of lead ores at the Trail smelter. In 1915, however, the recovery of lead in smelters was but little less than the estimated possible recovery (on the basis of a 90 per cent recovery) from ores shipped from mines, apparently indicating a reduction in stocks of ores at the smelter, but in 1916 the estimated possible recovery from lead ores shipped from mines exceeded by far the recovery in smelter, while in 1917 the possible recovery in ore shipped exceeded only slightly the recovery of lead in smelters.

Annual Production of Lead.

Year.	Pounds.	Cents per Pound.	Value.	Year.	Pounds.	Cents per Pound.	Value.
1887.	204,800	5.400	\$ 9,216	1902.	22,956,381	4.069	\$* 934,095
1888.	674,500	4.420	29,812	1903.	18,139,283	4.237	768,562
1889.	165,100	3.930	6,488	1904.	37,531,244	4.309	1,617,221
1890.	105,900	4.480	4,704	1905.	56,864,915	4.707	2,676,632
1891.	88,665	4.350	3,857	1906.	54,608,217	5.657	3,089,187
1892.	808,420	4.090	33,064	1907.	47,738,703	5.325	2,542,086
1893.	2,135,023	3.730	79,636	1908.	43,195,733	4.200	1,814,221
1894.	5,703,222	3.290	187,636	1909.	45,857,424	*3.690	1,692,139
1895.	16,461,794	3.230	531,716	1910.	32,987,508	*3.687	1,216,249
1896.	24,199,977	2.980	721,159	1911.	23,784,969	*3.480	827,717
1897.	39,018,219	3.580	1,396,853	1912.	35,763,476	*4.467	1,597,554
1898.	31,915,319	3.780	1,206,399	1913.	37,662,703	*4.659	1,754,705
1899.	21,862,436	4.470	977,250	1914.	36,337,765	*4.479	1,627,568
1900.	63,169,821	4.370	2,760,521	1915.	46,316,450	*5.600	2,593,721
1901.	51,900,958	4.334	2,249,387	1916.	41,497,615	*8.513	3,532,692
				1917.	32,576,281	*11.137	3,628,020

* In 1909 and 1910, average prices at Toronto as quoted by *Hardware and Metal*, in previous years average prices at New York, as quoted by *Engineering and Mining Journal*.

† Average price at Montreal. Quotations furnished by Thos. Robertson Co., Ltd., Montreal, Que.

Ores Shipped and Metal Contents.

Year.	Lead Ores Shipped in Tons.	Lead Contents in Pounds.	Silver Contents in Ounces.
1912.	59,814	45,896,537	2,366,294
1913.	85,978	53,807,570	2,564,155
1914.	70,207	50,527,130	2,501,820
1915.	88,647	48,708,005	2,954,175
1916.	84,516	54,124,628	2,582,952
1917.	46,799	38,696,116	1,670,064

Previous to 1904 lead ores mined in Canada were either exported as ore or smelted in Canadian furnaces and exported in the form of base bullion to be refined abroad. A lead refinery employing the Betts electrolytic process has been in operation at Trail, B.C., since 1904, treating the base bullion produced by the lead blast furnaces.

The North American Smelting Company erected a plant at Kingston, Ont., which started operations during the latter part of 1912, treating scrap and lead dross, as well as ores from the United States, British Columbia, and Ontario. This plant closed down November 1, 1913, but operations were resumed during the latter part of 1916 by the Kingston Smelting Co., Ltd., under lease. Operations were carried on for four months in 1917.

The Estate of James Robertson, operating the Kingdon lead mine at Galetta, put in a 20-ton open-hearth lead furnace, which was operated in October and November, 1916, and also for six months in 1917.

Refined Lead Produced.*

Year.	Pounds of Refined Lead Produced.	Year.	Pounds of Refined Lead Produced.	Year.	Pounds of Refined Lead Produced.
1904.....	7,519,440	1909.....	41,883,614	1913.....	39,663,766
1905.....	15,804,509	1910.....	32,987,508	1914.....	36,443,706
1906.....	20,471,314	1911.....	23,525,050	1915.....	43,518,618
1907.....	26,607,461	1912.....	37,008,490	1916.....	43,100,236
1908.....	36,549,274			1917.....	27,886,602

* The refined lead reported includes also that from foreign ores.

Prices.—The price of lead at Montreal, the main Canadian market, has been higher than the New York and London values for the past five years. The average price of lead at Montreal in 1917 was 11.137 cents per pound, as against 6.626 cents in London, 8.787 cents in New York, and 8.721 cents in St. Louis.

The Toronto price in winter is about the same as that at Montreal, but the latter falls during the period of summer freight rates about 10 cents per 100 pounds below the former.

The price of soft lead on the London market in 1917 was fixed at £30, as compared with an average of £30 19s. 6d. in 1916.

Yearly Average Prices of Lead in Montreal, London, New York, and St. Louis.

(Values in cents per pound.)

	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
Montreal.....	3.246	3.480	4.467	4.659	4.479	5.600	8.513	11.137
London.....	2.775	2.992	3.921	4.072	4.146	4.979	6.715	6.626
New York.....	4.446	4.420	4.771	4.370	3.862	4.673	6.858	8.757
St. Louis.....	4.312	4.286	4.360	4.238	3.737	4.567	6.777	8.721

Monthly Average Prices of Pig-Lead at Montreal.*

(Values in cents per pound.)

Month.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
January.....	4·94	3·67	3·35	3·48	3·31	3·93	4·32	4·78	4·27	7·29	9·50
February.....	4·88	3·60	3·38	3·40	3·32	3·97	4·18	4·73	4·58	7·73	11·35
March.....	4·92	3·54	3·42	3·34	3·34	4·03	4·05	4·57	5·04	9·25	11·77
April.....	4·92	3·44	3·35	3·21	3·26	4·10	4·42	4·41	5·21	9·60	11·54
May.....	4·84	3·21	3·26	3·13	3·20	4·08	4·66	4·54	5·26	9·10	13·19
June.....	4·93	3·11	3·23	3·15	3·27	4·34	4·98	4·55	6·53	8·48	14·62
July.....	4·98	3·17	3·12	3·13	3·33	4·57	4·93	4·49	6·35	7·79	13·26
August.....	4·69	3·31	3·08	3·11	3·45	4·84	5·02	4·48	5·62	7·76	13·14
September.....	4·85	3·24	3·14	3·11	3·63	5·47	5·02	4·42	5·63	8·41	10·93
October.....	4·56	3·29	3·26	3·23	3·77	5·07	4·99	4·07	5·71	8·61	8·46
November.....	4·25	3·42	3·28	3·31	3·93	4·53	4·82	4·29	6·39	8·72	7·92
December.....	3·65	3·37	3·34	3·35	3·95	4·55	4·52	4·41	6·61	9·42	7·92
Average	4·701	3·364	3·268	3·246	3·480	4·467	4·659	4·479	5·600	8·513	11·137

*Producers' prices for car-load quantities ex-cars Montreal as furnished by Thos. Robertson Co., Ltd., of Montreal.

Monthly Average Prices of Lead in New York.†

(Values in cents per pound.)

Month.	1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
January.....	5·600	6·000	3·691	4·175	4·700	4·483	4·435	4·321	4·111	3·729	5·921	7·626
February.....	5·465	6·000	3·725	4·018	4·613	4·440	4·026	4·325	4·048	3·827	6·246	8·636
March.....	5·350	6·000	3·838	3·986	4·459	4·394	4·073	4·327	3·970	4·053	7·136	9·199
April.....	5·404	6·000	3·993	4·168	4·376	4·412	4·200	4·381	3·810	4·221	7·630	9·288
May.....	5·685	6·000	4·253	4·287	4·315	4·373	4·194	4·342	3·900	4·274	7·463	10·207
June.....	5·750	5·760	4·466	4·350	4·343	4·435	4·392	4·325	3·900	5·932	6·936	11·171
July.....	5·750	5·288	4·447	4·321	4·404	4·499	4·720	4·353	3·891	5·659	6·352	10·710
August.....	5·750	5·250	4·580	4·363	4·400	4·500	4·569	4·624	3·875	4·656	6·244	10·594
September.....	5·750	4·813	4·515	4·342	4·400	4·485	5·048	4·698	3·828	4·610	6·810	8·680
October.....	5·750	4·750	4·351	4·341	4·400	4·265	5·071	4·402	3·528	4·600	7·000	6·710
November.....	5·750	4·376	4·330	4·370	4·442	4·298	4·615	4·293	3·683	5·155	7·042	6·249
December.....	5·900	3·658	4·213	4·560	4·500	4·450	4·303	4·047	3·800	5·355	7·513	6·375
Average	5·657	5·325	4·200	4·273	4·446	4·420	4·471	4·370	3·862	4·673	6·858	8·787

†From the *Engineering and Mining Journal*.

Monthly Average Prices of Lead in London.‡

(In £ Sterling per ton of 2,240 pounds.)

Month.	1908.	1909.	1910.	1911.	1912.
January.....	14 10 6	13 3 6	13 3 11	13 0 8	15 11 3
February.....	14 5 6	13 5 5	13 7 3	13 1 11	15 13 9
March.....	14 1 4	13 8 8½	13 2 9	13 2 11	15 19 8
April.....	13 15 10	13 7 0	12 13 9	12 18 5	16 6 6
May.....	13 2 7	13 5 3	12 11 8	12 19 2	16 10 2
June.....	12 15 7	13 2 4	12 13 9	13 5 5	17 11 8
July.....	12 19 6	12 13 3	12 11 8	13 10 11	18 8 9
August.....	13 9 10½	12 10 6	12 10 10	14 1 4	19 5 8
September.....	13 3 6	12 15 3	12 12 6	14 15 1	21 9 0
October.....	13 7 3	13 4 4	13 2 0	15 6 1	20 8 0
November.....	13 12 2	13 1 4½	13 4 6	15 15 5	18 4 7
December.....	13 3 6	13 2 11½	13 3 9	15 13 4	18 1 6
Yearly average.....	13 10 5	13 1 8	12 19 0	13 19 3	17 15 11

Month.	1913.	1914.	1915.	1916.	1917.
January.....	17 1 11	18 19 10	18 12 0	30 17 5	30 0 0
February.....	16 8 5	19 2 8	19 3 7	31 18 9	30 0 0
March.....	15 19 8	19 2 3	21 17 8	34 7 8	30 0 0
April.....	17 8 10	17 19 8	21 2 1	34 8 0	30 0 0
May.....	18 14 3	18 4 8	20 9 2	32 19 5	30 0 0
June.....	19 10 8	18 13 11	25 4 1	30 14 0	30 0 0
July.....	19 7 10	18 8 6	24 12 3	27 8 11	30 0 0
August.....	19 15 8	20 9 9	21 18 11	29 2 7	30 0 0
September.....	19 14 10	18 16 3	23 3 0	29 17 4	30 0 0
October.....	19 9 5	17 9 8	23 19 9	30 0 0	30 0 0
November.....	18 13 9	17 19 9	26 2 9	30 0 0	30 0 0
December.....	17 8 8	18 18 6	28 8 8	30 0 0	30 0 0
Yearly average.....	18 6 2	18 13 9	22 17 10	30 19 6	30 0 0

‡ As published by the Metal Information Bureau, London.

Exports and Imports.—The exports of lead in 1917 amounted to 14,414,900 pounds, valued at \$987,509, and consisted of lead in ores, concentrates, bullion, etc., 13,410,400 pounds, valued at \$925,056, and pig-lead 1,004,500 pounds, valued at \$62,453. The exports in 1916 amounted to 9,160,500 pounds, valued at \$565,890, and consisted of lead in ores, concentrates, bullion, etc., 9,048,400 pounds, valued at \$558,180, and pig-lead 112,100 pounds, valued at \$7,710.

The large increase in the exports for 1916 and 1917 is due to the fact that a few thousand tons of base bullion were exported from Trail, B.C., for refining in the United States.

The imports of lead in 1917 were 8,432 tons, valued at \$1,732,428, and included certain manufactures of lead valued at \$190,091 for which no equivalent quantity is given. In 1916, the imports were 13,580 tons, valued at \$2,077,896, and included manufactures of lead valued at \$155,278.

Exports of Lead, 1910 to 1917.

	Lead in Ore Concentrates, etc.		Pig Lead.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1910.....	46,800	\$ 1,308	7,712,253	\$248,174	7,759,053	\$249,482
1911.....	65,100	1,826	71,961	2,806	137,061	4,632
1912.....	299,240	8,193			299,240	8,193
1913.....	329,963	9,136			329,960	9,136
1914.....	246,100	2,681	510,573	19,507	756,673	22,188
1915.....	1,845,100	40,273	2,066,929	79,067	3,912,029	119,340
1916.....	9,048,400	558,180	112,100	7,710	9,160,500	565,890
1917.....	13,410,400	925,056	1,004,500	62,453	14,414,900	987,509

Imports of Lead, 1915, 1916, and 1917.

	1915.		1916.		1917.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.
Old scrap, pig and block.....	21,308	\$2,010,006	9,933	\$1,258,284	5,755	\$958,402
Bars and sheets.....	456	56,331	492	85,686	523	111,002
Pipe.....	73	8,708	109	21,450	139	29,502
Shot and bullets.....	543	51,890	39	6,390	13	2,163
Manufactures of lead (a).....		102,439		155,278		190,091
Tea lead.....	480	67,652	1,073	198,541	245	59,231
Litharge.....	790	89,232	1,384	211,359	1,404	275,919
Total.....	23,650	2,386,258	13,030	1,936,988	8,079	1,626,310
Metallic lead contained in imported lead pigments.....	719	96,658	550	140,908	353	106,118
	24,369	2,482,916	13,580	2,077,896	8,432	1,732,428

(a) Includes nitrate and acetate of lead in 1915, 250,921 pounds valued at \$23,269; and in 1916, 224,648 pounds valued at \$30,445.

Imports of Lead in Pigs, Bars, Sheets, etc., and Manufactures.

Fiscal Year.	Old Scrap, Pig and Blocks.			Bars and Sheets.			Litharge.		
	Cwt.	Value.	Average price.	Cwt.	Value.	Average price.	Cwt.	Value.	Average price.
1907.....	79,673	\$ 363,655	\$4.56	19,177	\$ 86,338	\$ 4.50	17,516	\$ 85,557	\$4.88
1908.....	49,825	155,513	3.12	14,402	49,527	3.44	15,524	57,929	3.73
1909.....	112,980	184,572	1.63	13,412	44,071	3.29	17,049	58,100	3.41
1910.....	120,591	346,516	2.87	17,697	45,674	2.58	15,541	56,049	3.61
1911.....	199,774	495,923	2.48	30,837	55,458	1.80	17,979	65,743	3.66
1912.....	281,787	940,533	3.34	19,212	93,702	4.88	25,925	113,941	4.40
1913.....	111,995	464,117	4.14	14,944	62,527	4.18	10,009	50,734	5.07
1914.....	154,141	590,557	3.82	9,615	41,244	4.29	10,863	52,525	4.84
1915.....	426,162	2,010,006	4.72	9,125	56,331	6.17	15,798	89,232	5.68
1916.....	198,658	1,258,284	6.33	9,850	85,686	8.70	27,672	211,359	7.64
1917.....	115,104	958,402	8.33	10,458	111,002	10.61	28,079	275,919	9.83

Imports of Lead in Pigs, Bars, Sheets, etc., and Manufactures—*Concluded.*

Calendar Year.	Pipe Lead.			Shot and Bullets.			Tea Lead.			Other Manufactures of Lead. (a).
	Pounds.	Value.	Cents per pound.	Pounds.	Value.	Cents per pound.	Pounds.	Value.	Cents per pound.	Value.
1910.	403,012	\$ 15,365	3-81	6,903	\$ 311	4-55	2,371,136	\$117,399	4-95	\$ 107,688
1911.	512,737	19,426	3-79	8,912	1,053	11-82	2,688,211	134,160	4-99	108,012
1912.	688,383	32,423	4-70	477,047	23,163	4-86	3,212,861	167,716	5-22	144,571
1913.	466,753	21,679	4-64	429,656	19,582	4-56	3,475,171	217,009	6-24	155,178
1914.	565,762	26,282	4-65	180,639	10,542	5-84	1,687,029	108,097	6-41	99,285
1915.	145,953	8,708	5-97	1,085,196	51,890	4-78	959,189	67,652	7-05	102,439
1916.	217,905	21,450	9-84	78,474	6,390	8-14	2,145,854	198,541	9-25	124,833
1917.	278,207	29,502	10-60	25,147	2,163	8-60	490,364	59,231	12-08	165,764

(a) Does not include nitrate and acetate of lead in 1915, 250,921 pounds, valued at \$23,269; in 1916, 224,648 pounds, valued at \$30,445; and in 1917, 188,068 pounds, valued at \$24,327.

Imports of Dry White and Red Lead and Orange Mineral, and White Lead Ground in Oil.

Calendar Year.	Dry White Lead.		Dry White Lead, Ground in Oil.		Dry Red Lead and Orange mineral.		Total Imports.		Cents. per pound.
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	
1907.	7,560,185	\$403,941	512,473	\$ 29,063	443,905	\$ 30,203	8,516,563	\$463,207	5-44
1908.	2,913,799	119,860	415,606	18,429	638,518	25,367	3,967,923	163,656	4-12
1909.	2,690,575	95,894	730,001	32,678	516,032	25,341	3,936,608	153,913	3-91
1910.	2,076,629	75,463	811,519	37,475	881,788	31,803	3,769,927	144,741	3-84
1911.	1,467,193	58,335	1,033,732	46,986	1,571,508	64,180	4,072,433	169,501	4-16
1912.	2,499,725	138,627	714,362	37,916	2,539,767	113,579	5,753,854	290,122	5-04
1913.	1,162,082	61,424	1,057,683	59,444	2,389,460	103,739	4,609,225	224,607	4-87
1914.	363,136	20,279	546,961	31,654	1,451,264	62,073	2,361,361	114,006	4-83
1915.	448,920	23,393	169,095	9,590	1,091,120	63,675	1,709,135	99,658	5-66
1916.	200,256	15,746	59,601	5,203	1,423,351	119,959	1,683,208	140,908	8-37
1917.	200,832	19,229	67,383	6,321	833,603	80,568	1,081,580	106,188	9-63

Consumption.—The production of lead, as already stated, was in 1917, 16,288 tons, while the exports were 7,207 tons, leaving a balance of 9,081 tons, by adding to this amount the 8,432 tons of imports and the manufactures, we get a total consumption for Canada of about 18,000 tons, as against 30,000 tons in 1916, and 46,000 in 1915.

This estimate of consumption for 1916 is probably incomplete because of the fact that very large quantities of materials chiefly for munitions, and no doubt including lead, have been imported for the use of the Imperial Government. These imports for record purposes have been entered under one general item and not separately classified. Information received from other sources shows that the total consumption in 1916 and also in 1917 amounted to at least 55,000 tons.

Estimated Consumption of Lead.

Year.	Tons.	Year.	Tons.	Year.	Tons.
1908.	22,000	1911.	28,000	1914.	29,000
1909.	25,000	1912.	39,000	1915.	46,000
1910.	24,000	1913.	30,000	1916.	55,000
				1917.	55,000

Quebec.

The production of lead in Quebec during 1917 amounted to 1,378,001 pounds, valued at \$153,468, as against 698,760 pounds, valued at \$59,485 in 1916; and 40,401 pounds, valued at \$2,262, in 1915. This production was wholly from the zinc-lead deposits of Notre-Dame-des-Anges.

Ontario.

The Ontario production of lead in 1917 was 1,586,711 pounds, valued at \$176,712, as against 685,932 pounds, valued at \$58,393, in 1916, and 88,985 pounds, valued at \$4,983, in 1915.

The principal producer was the property of the James Robertson estate at Galetta, with also shipments from the Frontenac mine, Perth road, and the North Victoria mine, Victoria county.

British Columbia.

The production of refined lead together with lead in ores exported amounted in 1917 to 29,483,725 pounds, valued at \$3,283,602, as against 39,157,701 pounds, valued at \$3,333,496, in 1916, a decrease of 24.2 per cent in quantity and 1.5 per cent in value.

Almost all of the lead ore mined in British Columbia is smelted and refined at Trail, B.C. In 1915 and 1916, however, the Surprise mine shipped its total output, amounting to a considerable tonnage to the United States, but in 1917 only a small amount was shipped to the United States, most of the shipments going to Trail, B.C.

According to the Provincial Department of Mines, 37,307,465 pounds of lead were contained in the lead ores shipped to the smelters for which returns had been received during 1917.

The record given in the following table represents the recovery of lead at smelter or refinery as distinguished from the figures given in the table next succeeding, which indicate the quantities of lead contained in ore sent to the smelters.

A study of the table of production by districts, shows that in 1917 the Fort Steele district produced 35.9 per cent of the total, the Slocan 31.7 per cent, and the Ainsworth 17.1 per cent; while in 1916 the production was 49.6 per cent for Fort Steele, 29.6 per cent for Slocan, and 16.1 per cent for Ainsworth.

British Columbia: Production of Lead.

Year.	Pounds.	Value.	Cents per pound	Year.	Pounds.	Value.	Cents per pound.
1887.....	204,800	\$ 9,216	4 40	1902.....	22,536,381	\$ 917,005	4 069
1888.....	674,500	29,813	4 42	1903.....	18,089,283	766,443	4 237
1889.....	165,100	6,488	3 93	1904.....	36,646,244	1,579,086	4 309
1890.....				1905.....	56,580,703	2,663,254	4 707
1891.....				1906.....	52,408,217	2,964,733	5 657
1892.....	808,420	33,064	4 09	1907.....	47,738,703	2,542,086	5 325
1893.....	2,131,092	79,490	3 73	1908.....	43,195,733	1,814,221	4 200
1894.....	5,703,222	187,636	3 29	1909.....	45,857,424	1,692,133	*3 690
1895.....	16,461,794	531,716	3 23	1910.....	32,987,508	1,216,249	*3 687
1896.....	24,199,977	721,159	2 98	1911.....	23,764,969	827,717	*3 480
1897.....	38,841,135	1,390,513	3 58	1912.....	35,763,476	1,597,554	*4 467
1898.....	31,693,559	1,198,017	3 78	1913.....	37,626,899	1,753,037	*4 659
1899.....	21,862,436	977,250	4 47	1914.....	36,289,845	1,625,422	*4 479
1900.....	62,158,621	2,760,031	4 37	1915.....	45,377,064	2,541,116	*5 600
1901.....	51,582,906	2,235,603	4 334	1916.....	39,157,701	3,333,496	*8 513
				1917.....	29,483,725	3,283,602	*11 137

*Average prices at Toronto for years 1909 and 1910. For previous years average prices at New York.

†Average price at Montreal. Quotations furnished by Thos. Robertson Co., Ltd., Montreal, Que.

British Columbia: Production of Lead by Districts.*

(Lead contained in ore shipped from Mines, in pounds.)

District.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
Cassiar—							
Atlin.....						7,260	
Skeena, etc.....	238,578	41,512	6,579		30,462	1,077	
East Kootenay—							
Fort Steele.....	17,158,069	18,238,238	18,525,083	24,863,105	26,582,050	24,156,143	13,996,640
Windermere, etc.....		2,249,237	2,495,255		216,327	571,244	1,774,649
West Kootenay—							
Ainsworth.....	289,009	4,863,894	9,027,861	8,069,525	3,436,184	7,841,869	6,395,350
Nelson.....	1,928,836	2,293,000	1,936,418	2,004,436	967,775	1,240,784	2,605,666
Slocan.....	6,705,571	16,944,811	22,648,766	15,233,910	14,925,345	14,415,645	11,808,019
Revelstoke, etc.....	522,615	240,762	521,771	128,912	89,041	206,741	395,321
Yale—							
Yale—Kamloops.....						47,380	12,690
Similkameen, etc.....							10,697
Grand Forks, etc.....	29,719		45,982	1,678	7,127	14,922	36,548
Cariboo—							
Omineca.....			156,862	323,482	249,279	224,451	271,885
	26,872,397	44,871,454	55,364,677	50,625,048	46,503,590	48,727,516	37,307,465

*From the Report of the Minister of Mines, B.C.

Yukon.

During the last few years several properties have been developed and have shipped occasionally, but they have been handicapped by the high cost of development and supplies, and by the heavy transportation charges.

The most important operations being conducted during 1916 and 1917 were in what is known as the "Mayo" area, north of the Stewart river. About 1,500 tons of very rich silver-lead ore were shipped in 1916 from the Silver King property on Galena creek to the Selby smelter at San Francisco. Shipments were rather small during 1917. This area is one of the most important placer-gold producing districts of Yukon Territory, but valuable lode deposits have also been discovered.

Bounties.—In 1901, and again in 1903, the Dominion Government, to encourage the lead industry, authorized the payment of a bounty on the production of lead. The Act of 1903 provided for the payment, under certain restrictions, of 75 cents per hundred pounds of lead contained in ore mined and smelted in Canada, provided that when the standard price of pig-lead in London, England, exceeded £12 10s. per ton of 2,240 pounds, such bounty should be reduced proportionately by the amount of such excess. Thus, when the price of lead in London rose to £16, or over, per long ton, the bounty ceased. As the price of lead exceeded £16 sterling on the London market for a considerable period during 1906 and 1907 the bounty paid during those years was comparatively small.

The Act of 1903 provided that payment of bounty should cease on June 30, 1908, and as only a portion of the funds provided had been used, a new Act was passed in the latter year providing for further bounty payments at the rate of 75 cents per hundred pounds, or approximately £3 10s. per ton of 2,240 pounds, subject to the restriction that when the price of lead in London exceeds £12 10s. the bounty shall be reduced by such excess.

The Act of 1908 expired in 1913, and a new Act was passed extending the bounty for a further period of five years, with the same provisions. The text of this Act and of the regulations under which the Act is administered may be consulted in the "Annual Report on Mineral Production for 1914," and previous years.

There was no bounty paid on lead during the fiscal years ending March 31, 1917, and March 31, 1918.

Statement of Bounties Paid on Lead during the Fiscal Years 1899 to 1918.

Year ending.	Bounty paid.	Year ending.	Bounty paid.	Year ending.	Bounty paid.
June 30, 1899.....	\$ 76,665	June 30, 1906.....	\$ 90,196	March, 31, 1913.....	\$ 68,065
" 30, 1900.....	43,335	March 31, 1907.....	1,995	" 31, 1914.....	8,179
" 30, 1901.....	30,000	" 31, 1908.....	51,001	" 31, 1915.....	3,217
" 30, 1902.....		" 31, 1909.....	307,433	" 31, 1916.....	59
" 30, 1903.....	4,380	" 31, 1910.....	340,542	" 31, 1917.....	
" 30, 1904.....	195,627	" 31, 1911.....	248,534	" 31, 1918.....	
" 30, 1905.....	330,645	" 31, 1912.....	179,288	Total.....	1,979,164

MERCURY.

There has been no production of mercury since 1897. The small production reported in 1895 and 1897 was derived from the deposits at the western end of Kamloops lake, B.C. These deposits consist of quartz veins containing pockets of cinnabar in a zone of decomposed Tertiary volcanic rocks.

Elsewhere in Canada mercury has been reported as also occurring in ores of the Cobalt district, and in the neighbourhood of Field, B.C., and Sechart, on the west coast of Vancouver Island.

The imports of mercury during 1917 were, 71,608 pounds, valued at \$76,332, as against 79,204 pounds, valued at \$74,461 in 1916.

Production of Mercury.

Calendar Year.	Flasks.*	Price per flask.	Value.
1895.....	71	\$ 33.00	\$ 2,343
1896.....	58	33.44	1,940
1897.....	9	36.00	324

* Seventy-six and one-half (76½) pounds each.

Imports of Mercury.

Calendar Year.	Pounds.	Value.	Calendar Year.	Pounds.	Value.
1907.....	189,841	\$ 82,873	1913.....	219,442	\$ 109,493
1908.....	87,620	44,030	1914.....	204,229	97,449
1909.....	285,958	147,625	1915.....	184,432	159,184
1910.....	107,888	63,450	1916.....	79,204	74,461
1911.....	118,336	67,416	1917*.....	71,608	76,322
1912.....	137,474	72,171			

* Duty free.

Average Monthly Price of Mercury.

(Per flask of 75 pounds.)

Month.	1916.			1917.		
	New York.	San Francisco.	London.	New York.	San Francisco.	London.
January.....	\$ 231.50	\$ 200.50	£ 16.75	\$ 81.04	\$ 80.20	£
February.....	283.50	300.63	17.88	120.90	116.25	.....
March.....	213.75	223.75	19.00	113.30	112.50	.....
April.....	140.78	147.50	17.75	115.64	115.00	.....
May.....	95.10	97.50	16.50	105.98	105.00	.....
June.....	73.00	73.81	16.50	84.34	86.20	.....
July.....	79.80	79.90	17.30	107.80	102.18	.....
August.....	74.75	75.00	17.50	115.00	111.10	.....
September.....	75.50	75.06	17.50	112.21	110.90	.....
October.....	79.40	75.80	19.50	100.94	100.62	.....
November.....	79.25	75.50	18.25	102.50	100.75	.....
December.....	80.00	78.00	18.63	115.90	111.65	.....
Year.....	125.49	125.25	17.75	106.30	104.36	.....

MOLYBDENUM.

The total production in 1917, representing the quantity paid for of the MoS_2 contents of the concentrates produced, amounted to 288,705 pounds, which at \$1.00 per pound, the approximate equivalent at Ottawa of the British price, would be worth \$288,705. The total production in 1916, representing the MoS_2 contents of the concentrates produced was 156,461 pounds, which at \$1.00 per pound, would have a total value of \$156,461, while in 1915 the production was 29,210 pounds valued at \$28,450; and in 1914, 3,814 pounds valued at \$2,063.

In 1917, the total shipments of ores and concentrates as stated by the producers were 1,554.3 tons valued at \$320,006 and there were 22,605 tons of ore treated at the concentrating plants; in 1916, the total shipments were 6,539 tons valued at \$188,316 and 9,106 tons of ore were concentrated; in 1915, the shipments were 216 tons valued at \$28,450, and in 1914, 16.5 tons valued at \$2,063. Some small shipments were made previously in 1902 and 1903.

The ore produced has been chiefly low grade material carrying less than 2 per cent MoS_2 but included small quantities of ore running from 2 to 15 per cent MoS_2 and some higher grade hand picked material.

All the ore produced was concentrated in Canadian mills erected for the purpose, and marketed either as concentrates, molybdic acid, or ammonia molybdate, or as ferromolybdenum for the manufacture of which two electric furnace plants have been established: the plant of the Orillia Molybdenum Company at Orillia, and that of the Tivani Electric Steel Company, at Belleville, both in Ontario.

The concentrating plants are as follows:—¹

American Molybdenite Co., Haliburton Co., Ont.

Dominion Molybdenite Co., Ltd., at Quyon, Que.

International Molybdenum Co., at Renfrew, Ont.

Mines Branch Plant, Ottawa, Ont.

Renfrew Molybdenum Mines, Ltd., at Mt. St. Patrick, Renfrew Co., Ont.

The world's production of molybdenum ores in 1917 was much greater than that of any previous year, the production for Canada as stated above, being over 144 tons. In 1916 the Canadian production was over 78 tons, while Australia was credited with 123 tons and Norway with approximately 112 tons.

The Canadian Munitions Resources Commission in its first annual report, recently issued, has published very interesting information *re* the molybdenite industry as is shown in the following extracts:—

"In 1911 the world's production came mostly from Australia, which in that year was credited with 121 tons. Norway produced $2\frac{1}{2}$ tons and Canada practically nothing. In 1914 the Department of Mines again took up the subject, and made experiments in its Ore Dressing Laboratories on the concentration of molybdenum ores. In the spring of 1915 the Department was in a position to offer its services to the Imperial Munitions Board to obtain supplies of this mineral should they be required by the Imperial authorities. The desirability of encouraging Canadian production was for several months impressed upon the Imperial authorities, but it was not until early in 1916 that the Imperial Munitions Board was authorized to purchase any considerable quantity of molybdenite in Canada."

"The situation at that time was that only a very few of the known localities had been developed to the point of production, and because no facilities existed for milling and concentrating, the Imperial Munitions Board looked to the Department of Mines

¹ The American Molybdenite Co.'s plant was ready for operation only early in 1918. The International Molybdenite Co.'s plant treats customs ore as well as its own, and the Mines Branch plant treats customs ore only.

for assistance. The department responded by turning over its Ore Testing Laboratory into practically a small commercial mill and, during 1916, from nearly 2,300 tons of ore received from various localities, produced 40.5 tons of molybdenite concentrate which was turned over to the Imperial Munitions Board at the official British price of \$1.09 per pound of pure molybdenite, f.o.b. Ottawa. During 1917 the department milled 1,600 tons of crude ore, producing 31.4 tons of molybdenite in the form of concentrates."

"From the beginning of the war until the end of 1917, molybdenite, metallic molybdenum, its alloys and salts, were under an embargo in Canada, which prohibited their export to any other country outside the British Empire. All sales of ores from the British Empire made to the Imperial authorities were based on the official price of 105 shillings per unit (1 per cent of a long ton) of the pure mineral, delivered f.o.b. Liverpool."

"The prices in countries outside the Empire were always higher than the official British quotations. The open market price in the United States during 1917 was approximately \$2.25 per pound of pure mineral delivered at buyer's works. Canadian producers contended that this difference in price unduly favoured production outside the Empire. The British Government, was, however, securing practically all its requirements within the Empire, and the higher price in the United States was chiefly due to the inadequate supply in that country."

"The establishment of the new ferro-alloy industry in Canada is important. Canada, with her abundant hydro-electric power, should take an important position in the electric furnace production of all classes of ferro-alloys.

"Some difficulty was experienced in persuading the Imperial authorities to accept ferro-molybdenum instead of the raw material. It was contended that English smelters were equipped to handle the ores and therefore a duplication of these facilities in Canada was unnecessary. This objection was met by pointing out the desirability of manufacturing the ferro-alloy in this country because it allowed the Canadian producer a larger profit on his undertaking."

In 1910 metallic molybdenum sold for about \$1.50 per pound while the present price of ferro-molybdenum containing 50 to 70 per cent molybdenum is valued at \$4.00 per pound of molybdenum content.

"In the peaceful arts the metal has found application as a constituent of tool steels, although its rival tungsten, because of an established production, has been preferred for this purpose. Molybdenum steels are being used in automobile construction and it is expected that the attention of the steel workers will be directed towards more extensive application of these special alloys. Molybdenum wire is used in the manufacture of electric lamps and to a more limited extent in the scientific instruments trades. Salts of molybdenum form valuable chemical reagents and are also used for colouring pottery."

"At the present time the principal Canadian producers are: The Dominion Molybdenum Company, Limited, Quyon, Quebec,¹ which disposed of the greater part of its product up to the end of 1917 to the Imperial Munitions Board; and the Renfrew Molybdenum Mines, Limited, Mount St. Patrick, Ont., which exports its total production to France. The Dominion Molybdenite Company sold its product to the Imperial Munitions Board in the form of ferro-molybdenum made in electric furnaces at smelter plants situated at Orillia and Belleville, Ont."

"Another property, not developed to the point of either the Dominion or Renfrew mines, is that owned by the Wood Molybdenite Company, Limited, situated at Squaw Lake, Pontiac county, Quebec, some 30 miles north of Shawville. This promises to be a producer before the end of the present year."

"There are properties in British Columbia, Ontario, Quebec, and Nova Scotia, some of which have produced a little ore while others are merely prospects. Amongst

¹"Report on the Molybdenite Deposits of the Moss mine, Quyon, Que." By Charles Camsell. Summary Report, Geol. Sur., 1916, p. 207, and "Report on the Molybdenite Deposits of Quyon district, Que." By Dr. M. E. Wilson, Canadian Mining Journal, March, 1918, pp. 78, 79.

these may be mentioned that of the Molybdenum Mining and Reduction Co., Ltd., on Alice arm, Observatory Inlet; the Moly mine, on Lost creek, and the Swanson property on Gray creek, Nelson mining division; the Index mine,¹ Lillooet mining division, all in British Columbia. Other less important discoveries have been made at Stave lake, Pitt river, and Grand Prairie. In Ontario small producers are the Spain mine, Renfrew county; the Chisholm mine, Addington county; the Lillico-Burrows mine, Haliburton county; the Horscroft mine, Victoria county; the O'Brien mine, Renfrew county, and some others. In Quebec there are Chaput and Hughes, the Davis, the Chabot, and the Chatelane, all in Pontiac county. In Nova Scotia properties have been developed at New Ross, Lunenburg county, and at Gabarus bay, Cape Breton, and small shipments made. Attention has recently been directed to certain deposits in Manitoba, more particularly to those in the vicinity of Falcon lake."²

Subsequent to the decision of the Canadian Government that exports of molybdenite and tungsten be licensed for shipment to France and the United States, the testing laboratories of the Department of Mines have been requested to undertake the custom milling of molybdenite ores for various private interests, but shipments will be received only until the 31st. July, 1918, in order that the operators may have an opportunity of taking advantage of the market in the United States and France, while undertaking the construction of their own concentrating mills.

Customs ores will be purchased on the basis of the following prices:—

Schedule of Prices

Governing the milling of molybdenite ores and concentrates delivered f.o.b. Dominion Government Testing Plant, Ottawa.

Concentrates will be made upon the following terms:—

- (1) On assay returns from samples dried at 212° F.
- (2) Moisture will be deducted.
- (3) The treatment charge to be \$5.65 per ton of 2,000 pounds of crude ore.
- (4) Credit will be given for molybdenite only. No allowance will be made for molybde or wulfenite.

(5) Recoveries of molybdenite per ton of 2,000 pounds dry ore delivered railway siding, Mines Branch Testing Laboratories, Ottawa:—

For molybdenite ores containing:—

(a)	Between	0.5% and 1.0%	inc. for	70%	of the total	Molybdenite	content.
(b)	"	1.1%	"	1.5%	"	78%	"
(c)	"	1.51%	"	2.0%	"	84%	"
(d)	"	2.1%	"	2.5%	"	87%	"
(e)	"	2.61%	"	3.0%	"	90%	"
(f)	"	3.0%	"	"	"	92%	"

Estimated World's Production of Molybdenum Ores, 1915.*

Country.	Ore Mineral.	Quantity (short tons).	Estimated per cent of molybdenum.	Weight of molybdenum. (short tons).
Canada.....	Molybdenite.....	14.3	50	7.2
New South Wales.....	"	35.5	51	19.2
Norway.....	"	87.0	45	39.1
Peru.....	"	3.0	49	1.5
Queensland.....	"	109.0	54	58.8
Spain.....	Wulfenite.....	29.0	20	5.8
United States.....	Molybdenite and wulfenite.	3,498.0	2.6	91.0
				222.6

* Estimated by Frank L. Hess of the United States Geological Survey, Mineral Resources, United States 1915, p. 810.

¹ "Report on the Index Molybdenite mine, Lilloet, B.C." By Dr. C. W. Drysdale. Summary Report of the Geol. Sur., 1916, p. 54.

² "Report on the Molybdenite Deposits at Falcon lake, Eastern Manitoba." By J. S. Delury. Canadian Mining Journal, December 1, 1917.

NICKEL.

The production of nickel in 1917 amounted to 84,330,280 pounds, valued at \$33,732,112, as compared with 82,958,564 pounds, valued at \$29,035,497 in 1916, an increase of 1·6 per cent, while in 1916 there had been an increase of 21·4 per cent over that of 1915.

There were mined in 1917, 1,509,841 tons of ore, and smelted 1,453,661 tons from which were produced 78,897 tons of Bessemer matte carrying approximately 41,887 tons of nickel and 21,196 tons of copper. The net value of the matte as reported by the operators, was \$12,004,141 which is based on an average price of 7·15 cents per pound for the copper, and 10·71 cents for the nickel. The average metal recovery in matte from the ores treated was 2·881 per cent nickel and 1·458 per cent copper, as against 2·714 per cent nickel and 1·474 per cent copper in 1916, and 2·675 per cent nickel and 1·541 per cent copper in 1915.

Production of Nickel from the Sudbury District Ores.†

	1913.	1914.	1915.	1916.	1917.
Ore mined..... Short tons.	781,697	1,000,364	1,364,048	1,566,333	1,509,841
Ore smelted..... "	823,403	947,053	1,272,233	1,521,689	1,453,661
Bessemer matte produced.... "	47,150	46,396	67,703	80,011	78,897
Copper content of matte..... "	12,938	14,448	19,608	22,430	21,196
Nickel content of matte..... "	24,838	22,759	34,039	41,298	41,887
Spot value of matte.....	\$7,076,945	\$7,189,031	\$10,352,344	\$12,116,333	\$12,004,141
Wages paid miners and smelters.....	\$3,291,956	\$3,096,911	\$3,555,912	\$4,841,662	\$5,438,830
Men employed.....	3,486	3,379	4,033	4,656	4,517

†Includes also the production from the Alexo mine, Timiskaming.

Total Annual Production of Nickel.

Calendar Year.	Pounds of nickel.	Cents per pound.	Value.	Calendar Year.	Pounds of nickel.	Cents per pound.	Value.
1889.....	830,477	60	\$ 498,286	1904.....	10,547,883	40	\$ 4,219,153
1890.....	1,435,742	65	933,232	1905.....	18,876,315	40	7,550,526
1891.....	4,035,347	60	2,421,208	1906.....	21,490,955	42	8,948,834
1892.....	2,413,717	58	1,399,956	1907.....	21,189,793	45	9,535,407
1893.....	3,982,982	52	2,071,151	1908.....	19,143,111	43	8,231,538
1894.....	4,907,430	38½	1,870,958	1909.....	26,232,991	36	9,461,877
1895.....	3,888,525	35	1,360,984	1910.....	37,271,033	30	11,181,310
1896.....	3,397,113	35	1,188,990	1911.....	34,098,744	30	10,229,623
1897.....	3,997,647	35	1,399,176	1912.....	44,841,542	30	13,452,463
1898.....	5,517,690	33	1,820,838	1913.....	49,676,772	30	14,903,032
1899.....	5,744,000	36	2,067,840	1914.....	45,517,937	30	13,655,381
1900.....	7,080,227	47	3,327,707	1915*.....	68,308,657	30	20,492,597
1901.....	9,189,047	50	4,594,523	1916*.....	82,958,564	35	29,035,497
1902.....	10,693,410	47	5,025,903	1917*.....	84,330,280	40	33,732,112
1903.....	12,505,510	40	5,002,204				

*Includes also the production from the silver ores of Cobalt district.

The nickel-copper ore is reduced in smelters and converters to a Bessemer matte, containing from 77 to 82 per cent of the combined metals; in 1917 it averaged 50·6 per cent nickel and 26·9 per cent copper, as against 51·6 per cent nickel and 28·0 per cent copper in 1916; 50·3 per cent nickel and 29·0 per cent copper in 1915; 49·0 and 31·1 respectively in 1914; and 52·7 and 27·4 respectively in 1913.

For the production of monel metal a special matte is produced with contents of about 22 per cent copper, and 58 per cent nickel, which is included in the total given. Monel metal is produced directly from this matte without the intermediate refining of either the nickel or the copper.

A paper on the "Manufactures of Nickel-Copper Alloy, Steel or Nicu Steel," by G. M. Colvocoresses, was read at the Annual Meeting of the Canadian Mining Institute in March, 1918. Practical tests of the processes are said to be carried on at present near Sudbury.

The industry based on the mining and metallurgical treatment of the nickel-copper ores of the Sudbury district, Ontario, ranks among the most important of Canada. Not only is there a considerable production of copper, but the nickel, which is the important product, supplies a very large proportion of the world's consumption of the metal.

The past few years development has very largely increased the known ore reserves of the district. These nickel-copper deposits have been the subject of special reports of the Mines Branch and Geological Survey at Ottawa, by the Ontario Bureau of Mines, Toronto, and recently by the Royal Ontario Nickel Commission.¹

Refined metallic nickel is now being recovered in Canadian refineries but only in small quantities and as a by-product in the smelting and refining of the silver-cobalt-nickel ores, nickel-oxide having been recovered in these smelters for several years. The recovery of nickel-sulphate was also reported for the first time, in 1915.² A considerable amount of nickel is probably contained in ores exported for smelting, for which no payment is received by the mines shipping and the amount finally recovered is impossible to ascertain.

The total estimated nickel content of the recoveries from silver-cobalt-nickel ores was in 1917, 556,961 pounds, as against 361,702 pounds in 1916, and 231,634 pounds in 1915.

The production of metallic nickel during the year was reported as 265,896 pounds valued by the operators at \$108,334, as against 79,360 pounds valued at \$31,538 in 1916; that of nickel-oxide and nickel sulphate was 657,549 pounds valued at \$122,963, as against 555,868 pounds valued at \$101,358 in 1916.

The companies engaged in mining and smelting nickel ores are:—

The Canadian Copper Company, subsidiary to the International Nickel Company, with smelter at Copper Cliff, Ontario, and refinery at Bayonne, New Jersey. This Company is completing the erection of a new refining plant at Port Colborne, Ontario, which will probably be in operation in July, 1918.

The Mond Nickel Company of London, England, with smelter at Coniston, Ontario, and refinery at Clydach, Swansea, Wales.

The British America Nickel Corporation, Ltd., which started erecting a smelter at the Murray mine, late in 1916, and early in 1918 a refinery near Lake Deschenes, Hull county, Que., although not shipping during the year, development was actively carried on.

The Alexo Mining Company, Ltd., which operated its mine at Porquis Junction on the Porcupine branch of the Timiskaming and Northern Ontario Railway, shipping nickel-copper ore to the Mond smelter at Coniston.

Nickel was recovered as a by-product in the smelters of the following companies:—

The Coniagas Reduction Company, Thorold, Ont.

The Deloro Smelting and Refining Co., Deloro, Ont.

The Metals Chemical Co., Ltd., Welland, Ont.

¹ Report on Nickel and Copper Deposits of Sudbury, Ont. By A. E. Barlow, Geol. Surv., Canada, No. 873, 1901.

The Sudbury Nickel Region. By A. P. Coleman, Ph.D., Bureau of Mines, Vol. XIV, Part III, 1904.

The Nickel Industry with special reference to the Sudbury Region, Ontario. Report by A. P. Coleman, Ph.D., Mines Branch, Ottawa, No. 170, 1913.

Report of the Royal Ontario Nickel Commission with Appendix, Toronto, 1917.

² See chapter on "Cobalt."

Prices.—The price of refined nickel in New York according to quotations published by the Engineering and Mining Journal remained at from 45 to 50 cents per pound until March. From March 7 until August 8 the price was 50 to 55 cents, and for the balance of the year it remained at 50 cents per pound for ordinary forms.

*Electrolytic nickel was five cents higher per pound.

The price of nickel in Europe in 1917 as given by the "London Mining Journal", was quoted throughout the year at £225 per long ton, or 48.9 cents per pound for exports. The home quotations were at £225 until first week of June. From June 9th. to the end of the year the price was £190 to £220, or 41.3 to 47.8 cents per pound.

In 1916 the price remained at £225 throughout the year.

Exports and Imports.—The exports of nickel in 1917 amounted to 81,272,400 pounds valued at \$8,708,650, as against 80,441,700 pounds valued at \$8,662,179 in 1916.

The imports of nickel in 1917 were valued at \$519,064 and included nickel in ingots, bars, sheets, etc., 853,845 pounds valued at \$369,346, and manufactures of nickel valued at \$149,718. In 1916 the imports were valued at \$414,410 and included nickel in ingots, bars, sheets, 892,436 pounds valued at \$325,326 and manufactures of nickel valued at \$89,084.

There is also a considerable import of nickel-plated ware.

Exports of Nickel since 1903.

Calendar year.	Pounds.	Value.	Cents per pound.	Calendar year.	Pounds.	Value.	Cents per pound.
1903	12,699,227	\$ 1,116,009	8-78	1911	32,619,971	\$ 3,676,396	11-27
1904	11,233,869	1,091,349	9-71	1912	44,221,860	4,661,758	10-54
1905	17,318,059	1,569,693	9-06	1913	49,459,017	5,195,560	10-50
1906	20,653,845	2,042,965	9-89	1914	46,528,327	5,149,427	11-07
1907	19,376,335	2,280,374	11-76	1915	66,410,442	7,394,446	11-13
1908	19,419,893	1,866,624	9-61	1916	80,441,700	8,662,179	10-77
1909	25,616,398	2,676,483	10-45	1917	81,272,400	8,708,650	10-72
1910	36,014,782	4,030,040	11-19				

Imports of Nickel, Nickel-Silver, and German Silver, 1916 and 1917.

	1916.		1917.	
	Pounds.	Value.	Pounds.	Value.
Nickel, nickel-silver, and German silver in ingots or blocks	179,367	\$ 66,515	303,853	\$ 123,976
Nickel, nickel-silver, and German silver in bars and rods, and also in strips, sheets or plates	713,072	258,811	549,992	245,370
Manufactures of German, Nevada, and nickel-silver, not plated		89,084		149,718
		414,410		519,064

In view of the large export of nickel from Canada to the United States, and its refinement in that country, a record of the imports into, and exports of nickel from the United States, may be of special interest and is shown below as compiled from the "Foreign Commerce of the United States."

The values of the United States exports ranged from 38.5 to 48.8 cents per pound, with an average of 40.7 cents in 1917, as against 37 to 46 cents per pound with an average of 38.7 cents per pound in 1916, and 34 to 43 cents per pound with an average of 38 cents per pound in 1914.

United States: Imports and Exports of Nickel.*

	1916.			1917.		
	Quantity.	Value.	Cents per pound.	Quantity.	Value.	Cents per pound.
<i>Imports into United States—</i>						
Ore and matteGross tons.	59,741	\$9,889,122	13.62	61,053	\$9,612,400	12.73
Nickel content.Pounds.	72,611,492			75,510,793		
<i>Exports from United States—</i>						
To FrancePounds.	2,823,132	1,101,813	39.02	1,232,142	562,105	45.62
" Italy"	2,715,521	1,110,035	40.88	5,470,042	2,392,711	43.74
" Netherlands"	523,463	227,910	43.54	..	..	..
" Russia in Europe"	7,767,875	3,010,599	38.76	168,000	64,700	38.51
" United Kingdom"	16,674,487	6,191,029	37.13	14,409,272	5,579,603	38.72
" Japan"	245,920	109,268	44.43	275,018	134,172	48.79
" Russia in Asia"	1,148,366	467,328	40.70	..	..	..
" Other countries"	1,505,247	734,511	48.80	441,938	207,221	46.89
	33,404,011	12,952,493	33.78	21,996,412	8,940,512	40.65

*From the "Foreign Commerce of the United States," Dec. 1917.

Imports of Nickel Ore and Matte into the United States during the following fiscal years ending June 30.*

From	1914.		1915.		1916.		1917.	
	Tons.	Pounds.	Tons.	Pounds.	Tons.	Pounds.	Tons.	Pounds.
Belgium	1,243	2,037,008	242	317,971	..	..	..	..
France . . . . .	..	..	..	..	297	514,828	..	..
Norway	3	5,040	366	530,704	..	..	..	..
Canada (a)	35,174	41,507,255	29,592	36,607,235	52,742	64,622,286	56,603	70,733,737
Oceania—French . . . . .	..	..	..	..	2,618	2,391,922	409	387,805
—Australia . . . . .	..	..	601	539,109	1,329	1,268,084	3,120	2,912,298
Peru . . . . .	..	..	..	..	1	118	..	..
Totals	36,420	43,549,303	30,801	37,995,019	56,987	68,797,238	60,132	74,038,840

* From Reports on the commerce and navigation of the United States, Department of Commerce, Washington, D.C.

(a) Values were: in 1914, \$5,621,480; in 1915, \$4,788,145; in 1916, \$8,596,921, and in 1917, \$9,219,634.

Exports of Nickel, Nickel-Oxide, and Matte from the United States during the following fiscal years, ending June.*

(In pounds).

To	1911.	1912.	1913.	1914.	1915.	1916.	1917.
Austria-Hungary			134,400	672,043	67,200		
Belgium		551,740	1,719,285	1,230,274	210,612		
Denmark					43,830	2,174	28,051
France	3,765,510	5,579,335	4,197,110	4,419,663	3,210,980	1,871,595	2,336,684
Germany	1,902,393	2,527,273	2,346,325	11,084,366	1,036,242		1,168,056
Italy	604,938	1,321,733	1,075,303	1,276,905	2,365,177	1,880,661	5,471,426
Netherlands	8,205,836	7,584,653	9,164,012	2,376,216	22,033	139,300	506,588
Norway					31,158	34,460	33,614
Portugal							66,520
Russia in Europe			7,250	186,626	4,082,280	5,371,089	4,917,075
Spain					700	112,450	158
Sweden					367,696	313,958	28,554
U. Kingdom—							
England	1,342,714	3,019,833	2,334,845	2,171,511	8,535,418	7,973,478	10,024,301
Scotland	3,114,166	5,970,045	6,878,264	5,433,081	7,817,384	6,113,198	5,820,442
N. America—							
Canada	8,926	3,373	16,379	42,529	52,949	11,646	27,169
Cuba						10	34,410
Mexico	40				1,779		249
West Indies (British)					300		
West Indies (Dutch)						10	
S. America—							
Brazil		*	1,796			473	7,623
Chili						100	101
Colombia			32				70
Asia—							
British India						411	
China							6,720
Hong Kong							13,899
Japan	1,957	4,005	5,447	2,028	308,444	597,257	237,944
Russia in Asia					1,423,030	1,226,990	
Oceania—							
British Australia and Tasmania	1,330		829		22,400	679	217,280
Philippine Islands						56	1,510
	18,947,810	26,561,990	27,881,277	28,895,242	29,599,612	25,649,995	31,005,606

* From Reports on the commerce and navigation of the United States, Department of Commerce, Washington, D.C.

Bounty on Refined Nickel and Nickel-Oxide.—Under the terms of "The Metal Refining Act, 1907," of the Province of Ontario (7 Edward VII, Chap. XIV), a bounty was authorized to be paid on nickel, cobalt, copper, and arsenic under certain conditions and restrictions during a period of five years following the passing of the Act (April, 1907). In March, 1912, the Act was amended to cover a further period of five years. The Act expired in April, 1917, and was not re-enacted.

The sections affecting nickel were as follows:—

The Treasurer of the Province may under the authority of such regulations as may from time to time be made in that behalf by the Lieutenant Governor in Council pay in each year to the refiners of the metals, or metal compounds hereinafter specified, when refined in the Province from ores raised and mined in the Province, a bounty on each pound of such metal or compound so refined, as follows:—

Class 1. On refined metallic nickel, or on refined oxide of nickel, 6 cents per pound on the free metallic nickel or on the nickel contained in the nickel-oxide, but nickel on which a bounty has already been paid in one form of product shall not be entitled to any further bounty in any other form, and the amount to be paid as bounty on the nickel products therein mentioned is not to exceed in all \$60,000 in any one year.

PLATINUM AND PALLADIUM.

In past years, the chief source of platinum production of Canada was the placer levels of British Columbia, principally in the Similkameen district.

During 1917 the reported recovery was 57 crude ounces valued at \$3,823, as against 15 crude ounces, valued at \$600 in 1916 and 23 crude ounces, valued at \$1,063 in 1915. It is possible that the production of platinum is considerably greater than actually reported. A perusal of the imports from Canada to the United States as given by the United States Department of Commerce, and the exports from Canada into the United States as given by the Canadian Department of Customs, shows that much larger quantities are leaving Canada. The Canadian export records have in the past included "Old and scrap" platinum as well as platinum in ores.

The exports from Canada into the United States were in 1917 platinum in concentrates, etc., 136 ounces, valued at \$11,309, and "old and scrap" 195 ounces valued at \$18,290, or a total of 331 ounces valued at \$29,599; as against 532 ounces valued at \$41,945 in 1916; and 236 ounces, valued at \$11,052 in 1915.

Annual Production of Platinum.

Year.	Value.	Year.	Value.	Year.	Crude Ounces.	Value.
1887	\$ 5,600	1895	\$ 3,800	1904		\$ 10,872
1888	6,000	1896	750	1905		500
1889	3,500	1897	1,600	1906		*
1890	4,500	1898	1,500	1907-1912		**
1891	10,000	1899	825	1913	18	489
1892	3,500	1900		1914		
1893	1,800	1901	457	1915	23	1,063
1894	950	1902	46,502	1916	15	600
		1903	33,345	1917	57	3,823

* See under Palladium.

** See explanation in text.

Annual Production of Palladium.

	Ounces.	Value.
1902 Palladium	4,411	\$ 86,014
1903 "	3,177	61,952
1904 "	952	18,564
1905 Metals of the platinum group	1,562	28,116
1906 "	314	5,652
1907-1917	(a)	

(a) See explanation in text.

Exports of Platinum.

Year.	Ounces.	Value.	Year.	Ounces.	Value.
1907	242	\$ 4,864	1913	158	\$ 7,929
1908	43	937	1914	43	2,161
1909	466	2,118	1915	236	11,052
1910	2,254	62,776	1916	532	41,945
1911	39	1,961	1917	331	29,599
1912	92	3,821			

Imports of Platinum.*

Calendar Year.	Crucibl-s.	Wire and bars, strips, sheets, or plates.	Retorts, pans, condensers, etc.	Total Imports.
	Value.	Value.	Value.	Value.
1907.....	\$ 2,974	\$ 89,719	\$ 3,415	\$ 96,108
1908.....	1,709	37,223	5,321	44,253
1909.....	3,617	61,441	9,432	74,590
1910.....	2,133	100,185	10,741	113,062
1911.....	4,549	170,944	.....	175,493
1912.....	7,874	224,216	73	232,163
1913.....	4,557	141,117	.....	145,674
1914.....	9,795	69,736	142	79,673
1915.....	5,147	65,040	13,900	84,087
1916.....	5,430	68,633	14,480	88,543
1917.....	6,834	107,409	36	114,279

* Platinum wire and platinum in bars, strips, sheets or plates; platinum retorts, pans, condensers, tubing and pipe, imported by manufacturers of sulphuric acid for use in their works; crucibles. Duty free.

The Royal Ontario Nickel Commission which investigated the nickel industry in Canada, made some most interesting observations on the platinum production derived from the Sudbury ores, and the prominence taken by platinum at the present time will justify an extensive quotation of their remarks and findings. The following extracts are taken from the Commission's Report:—

“Although the presence of gold and silver and of metals of the platinum group in practically all nickelliferous pyrrhotites throughout the world has long been known, their importance in connection with the Ontario nickel industry is even now practically unrecognized, except by those who recover and sell them.

“The nickel-copper ores of Sudbury are capable of producing much more palladium than the whole of the present world's supply, together with a very large proportion of platinum, iridium, and other metals of the platinum group. The quantity of palladium present is much in excess of the platinum. It may be mentioned that the assay of ores and mattes, and of other metallurgical products, for palladium is exceedingly difficult, and that the results published are often unreliable. They are commonly too low, so that the official or private figures given by the companies or otherwise obtained, are not likely to be too high. The recovery of palladium is also much more difficult than that of platinum or other metals of the platinum group, so that both the assay values reported and the recoveries which have been made, are undoubtedly lower than they should be. Anything which can be done to encourage the better recovery of these metals, or enforce the use of refining processes which recover them, would be justifiable, and particularly so now that platinum and palladium are increasingly required, and stand at so high a price. It may be mentioned that, apart from the Mond Nickel Company's method, the processes most likely to recover these metals are the electrolytic methods of refining.”

“In this connection, it may be stated that the blister copper obtained from practically all the sulphide copper ores throughout the world contains not only gold and silver, but also the metals of the platinum group, and that the electrolytic copper and bullion refiners are recovering increasing quantities year by year, partly through a tardy recognition of their presence, but mainly through extra care in endeavouring to recover them”.

“Although it is not possible to state correctly the actual quantity of the platinum metals present in the ores mined, the quantity recovered per ton of ore can be accurately determined from assay of the matte, provided the number of tons of ore smelted per ton of matte produced is known”.

"The Canadian Copper Company reports that the average content of precious metals per ton of matte for the three years ending 1915 was roughly as follows:—

Gold.....	0.05 oz. troy.
Silver.....	1.75 "
Platinum.....	0.10 "
Palladium.....	0.15 "

"The figures given by the company for an isolated month in 1915, were higher, as were also figures obtained by the Commission on samples received from the company in 1916, but the above may be taken for the purposes of calculation".

"The Mond Nickel Company has not furnished figures as to the precious metal contents of its matte, but from assays made on behalf of the Commission on samples obtained from that company, it would appear that the matte produced by the Mond Nickel Company is considerably richer in metals of the platinum group than that from the Canadian Copper Company."

"Taking the basis of \$50 which the United States Geological Survey regards as a fair average for platinum or palladium, and ignoring other metals of the platinum group, although they represent a considerable additional amount and are worth more per ounce, the weight and value of the platinum and palladium in the 63,567 tons of matte produced at Copper Cliff in the year ending December 31, 1916, would be 15,892 oz., worth \$794,600, a figure which may be regarded as conservative."

"Large though the figure is, it represents only the platinum metals actually present in the matte, such additional amounts as may have been present in the original ores and lost in smelting them to matte, being ignored. Hence, such recoveries as are made by the refining companies represent only the percentage recoveries on that present in the matte, and would be still lower on that in the original ores."

The following table shows the recovery of the precious metals by the International Nickel Company over a period of years together with the quantities of matte refined.

The Company points out that during part of the period covered by these figures, it was treating material from other sources, so that the whole of the recoveries could not be attributed to the Sudbury matte.

Recovery at the International Nickel Company's Works—New Jersey.

Year.	Matte Treated. (a)	Gold.	Silver.	Platinum.	Palladium.
	Tons.	Ounces.	Ounces.	Ounces.	Ounces.
1907.....	17-840	993-572	63,400-70	226-800	607-300
1908.....	18-839	5, 38-181	139,329-29	172-316	328-287
1909.....	18-407	2,113-669	63,138-66	546-627	1,270-598
1910.....	24-309	2,649-799	60,256-83	258-325	522-804
1911.....	26-840	2,203-052	70,954-38	665-552	753-363
1912.....	27-653	2,476-558	62,169-66	496-850	680-130
1913.....	38-733	2,336-405	77,924-03	292-863	298-780
1914.....	40-267			1,437-0	
1915.....	31-428				
1916.....	56-405	3,953,000	114,975-00	1,093-0	
1917.....					

(a) As published by the Royal Ontario Commission, p. 485, 1917.

"In 1916, 257 ounces of other platinum metals, mainly rhodium and iridium, were also recovered."

"The low values placed by the different companies upon the platinum metals content and upon that of the precious metals generally, including the gold and silver,

is shown by the fact that the Mond Nickel Company estimate that their ore resources will yield not over 70 cents precious metal value per ton of ore, and the British America Nickel Corporation \$1. An assay made by Ledoux and Company on a parcel of between 5,000 and 6,000 tons of ore shipped from the **Alexo mine** in 1915 showed 0.3 oz. of platinum and palladium per ton of ore. The Norwegian ore appears to yield about 50 cents per ton of ore. The Tasmanian ore has not been smelted alone, so that the recoveries cannot be given, but one large parcel is stated to have contained 0.06 oz. of platinum per ton. Palladium was not tested for."

"Bearing in mind the normal and particularly the present and future demands for all metals of the platinum group, investigations should be continued, both as to the amounts present and the possibility of increasing the recoveries. It need scarcely be pointed out that the electrolytic process of refining nickel matte acquires added value from the fact that it recovers these metals automatically at practically no additional cost."

"Palladium has long been used in dentistry, and is now largely replacing platinum, both in that work and in jewellery. It has risen in price since the war began until now it possesses as high a value as platinum, which it is likely to replace still further both in the above and other industries."¹

Average Yearly Prices of Platinum.*

(In Dollars per ounce troy).

	1911.	1912.	1913.	1914.	1915.	1916.	1917.
New York refined platinum	43.12	45.55	44.88	45.14	47.13	83.40	102.82
St. Petersburg, Russia, 83%	35.21	37.08	36.54				
Ekaterinburg crude metal platinum	35.09	37.05	36.25				

* From quotation in "Engineering and Mining Journal," p. 47, January 8, 1918.

(a) Estimate of World's Production of Crude Platinum.

Country.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
Borneo and Sumatra		200	200	*	*	*	*
Canada	30	30	50	30	100	60	80
Colombia	12,000	12,000	15,000	17,500	18,000	25,000	32,000
New South Wales	470	778	1,275	1,248	303	222	*
Russia	300,000	300,000	250,000	241,200	124,600	63,900	50,000
United States	628	721	483	570	742	750	605
	313,128	313,729	267,008	260,548	143,145	89,932	82,685

* No basis for estimate.

(a) From the Mineral Resources of the United States, July, 1918.

¹ Report of the Royal Ontario Nickel Commission, 1917, pp. 485, 486.

SILVER.

The total production of silver in 1917 amounted to 22,221,274 ounces valued at \$18,091,895 and included: (a) refined silver, or silver contained in silver and gold bullion, 18,214,066 ounces, or 82.0 per cent; (b) silver contained in blister copper and copper matte 606,164 ounces of 2.7 per cent; and (c) silver estimated as recoverable from ores exported 3,401,044 ounces, or 15.3 per cent.

The total production in 1916 was 25,459,741 fine ounces, valued at \$16,717,121, and included: (a) refined silver, or silver contained in silver or gold bullion, 20,465,384 ounces, or 80.3 per cent; (b) silver contained in blister copper and copper matte, 779,916 ounces, or 3.1 per cent; and (c) silver estimated as recoverable from ores exported 4,214,441 ounces, or 16.6 per cent.

For the last few years, the production had shown a falling off both in quantity and value; while in 1916, the production decreased 4.4 per cent and the value increased 26.3 per cent, and in 1917 the production again decreased 12.7 per cent while the value increased 8.2 per cent.

From 1887 to 1893, the production ranged in value between \$300,000 and \$400,000, and was derived chiefly from Ontario and Quebec. The next three years saw a rapid increase in production, due to the development of the silver-lead deposits of British Columbia, and in 1896 a production of over \$2,000,000 is recorded. From that year until 1905, the production varied between \$2,000,000 and \$3,500,000 rising rapidly during the next six years to \$17,580,455 in 1910, as a result of the discovery of the rich ores of the Cobalt district. Since then, there has been a falling off in quantity, but owing to the higher price of the metal, the total value was higher in 1912, 1913, 1916, and 1917.

Annual Production of Silver, 1887 to 1917.

Year.	Ounces.	Value.	Cents per ounce.	Year.	Ounces.	Value.	Cents per ounce.
1887.....	355,035	\$ 347,271	98-00	1903.....	3,193,581	\$1,709,642	53-45
1888.....	437,232	410,998	94-00	1904.....	3,577,526	2,047,095	57-22
1889.....	383,318	358,785	93-60	1905.....	6,009,023	3,621,133	60-35
1890.....	400,687	419,118	104-60	1906.....	8,473,379	5,659,455	66-79
1891.....	414,523	409,549	98-00	1907.....	12,779,799	8,348,659	65-33
1892.....	310,651	272,130	86-00	1908.....	22,106,233	11,686,239	52-86
1893.....		330,128	77-00	1909.....	27,529,473	14,178,504	51-50
1894.....	847,697	534,049	63-00	1910.....	32,869,264	17,580,455	53-49
1895.....	1,578,275	1,030,299	65-28	1911.....	32,559,044	17,355,272	53-30
1896.....	3,205,343	2,149,503	67-06	1912.....	31,955,560	19,440,165	60-83
1897.....	5,558,456	3,323,395	59-79	1913.....	31,845,803	19,040,924	59-79
1898.....	4,452,333	2,593,929	58-26	1914.....	28,449,821	15,593,630	54-81
1899.....	3,411,644	2,032,658	59-53	1915.....	26,625,960	13,228,842	49-63
1900.....	4,468,225	2,740,362	61-33	1916.....	25,459,741	16,717,121	65-66
1901.....	5,539,192	3,265,354	58-95	1917 (a).....	22,221,274	18,091,895	81-417
1902.....	4,291,317	2,238,351	52-16				

(a) Included a very small production from New Brunswick and Alberta.

Ontario produced in 1905, 40.9 per cent of the output of Canada, in 1911 its percentage was 93.8; in 1914 it had fallen to 88.4 per cent; in 1915 it decreased again to 85.4 per cent; in 1916 to 84.9 per cent, while in 1917 it increased to 86.7 per cent of the total.

The production of British Columbia, which has varied between two and five million ounces for the last twenty years, was in 1914, 11.1 per cent of the total production of Canada; in 1915 it increased to 13.4 per cent; in 1916 it was 13.3 per cent and in 1917 it decreased to 11.9 per cent of the total.

The balance of the production —1.2 per cent is derived from Quebec, Manitoba and the Yukon, with also a very small production from New Brunswick and Alberta.

Production of Silver by Provinces, 1887-1917.

Year.	Ontario.		Quebec.		British Columbia.		Yukon Territory.	
	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.
1887	190,495	\$ 186,304	146,898	\$ 143,666	17,690	\$17,301		
1888	208,064	195,580	149,388	140,425	79,780	74,993		
1889	181,609	169,986	148,517	139,012	53,192	49,787		
1890	158,715	166,016	171,545	179,436	70,427	73,666		
1891	225,633	222,926	185,584	183,357	3,306	3,266		
1892	41,581	36,425	191,910	168,113	77,160	67,592		
1893		8,689		126,439		195,000		
1894			101,318	63,830	746,379	470,219		
1895			81,753	53,369	1,496,522	976,930		
1896			70,000	46,942	3,135,343	2,102,561		
1897	5,000	2,990	80,475	48,116	5,472,971	3,272,289		
1898	85,000	49,521	74,932	43,655	4,292,401	2,500,753		
1899	202,000	120,352	40,231	23,970	2,939,413	1,751,302	230,000	\$ 137,034
1900	161,650	99,140	58,400	35,817	3,958,173	2,427,548	290,000	177,857
1901	151,400	89,250	41,459	24,440	5,151,333	3,036,711	195,000	114,953
1902	145,000	75,632	42,500	22,168	3,917,917	2,043,586	185,900	96,985
1903	17,777	9,502	23,600	15,287	2,966,204	1,601,471	156,000	83,362
1904	206,875	118,376	15,000	8,583	3,222,481	1,843,935	133,170	76,201
1905	2,451,356	1,479,442	19,620	11,841	3,439,417	2,075,757	89,630	54,093
1906	5,401,766	3,607,894	17,686	11,813	2,990,262	1,997,226	63,665	42,522
1907	9,982,363	6,521,178	16,000	10,452	2,745,448	1,793,519	35,988	23,510
1908	19,398,545	10,254,847	13,299	7,030	2,631,389	1,391,058	63,000	33,304
1909	21,822,099	12,784,126	13,233	6,815	2,649,141	1,364,387	45,000	23,176
1910	30,366,366	16,241,755	7,593	4,061	2,407,887	1,287,883	87,418	46,756
1911	30,540,754	16,279,443	18,435	9,827	1,887,147	1,005,924	112,708	60,078
1912	29,214,025	17,772,352	9,465	5,758	2,651,002	1,612,737	81,068	49,318
1913	28,411,261	16,987,377	34,573	20,672	3,812,343	1,980,483	87,626	52,392
1914	25,139,214	13,779,055	57,737	31,646	3,159,897	1,731,971	92,973	50,959
1915	22,748,609	11,302,419	63,450	31,524	3,565,852	1,771,658	248,049	123,241
1916	21,608,158	14,188,133	98,610	64,748	3,392,872	2,227,794	360,101	236,446
1917	19,301,835	15,714,975	136,914	110,885	2,655,994	2,162,430	119,605	97,379

Prices.—The average price of silver in New York for the year 1917 was 81.417 cents per ounce, as against 65.661 cents in 1916.

The price of silver remained fairly stationary around 75 cents until June. During May and June purchases were made by India and China at higher prices than the New York market and shipments were made from the Pacific coast. A large sale was made in July to the Russian Government and the prospect of good crops for India stimulated the price for silver so much so that the highest quotation of \$1.08½ was reached in September.

Then the Indian Government took control of all imports of silver, and China was induced by the British Government to stop buying silver, which facts account for the decline in the silver quotations during the last quarter of 1917.

"The notable events of the year in the silver market have been: (a) the highest price in 40 years; (b) the enormous coinage of rupees in India (207,737,326); (c) the unusual large purchases by India from China and the Philippines; (d) the large purchase by Russia; and (e) the diversion of the usual flow of silver through New York to an equal exportation through San Francisco."¹

In London the average price for the year was 40.851 pence per standard ounce (925 parts fine), as against 31.315 pence in 1916. The minimum price was 36½ pence early in January, while the maximum was 54 pence late in September and the year closed with the price at 43 pence per standard ounce.

¹ The Engineering and Mining Journal, January 12, 1918, p. 51.

Yearly Average Prices of Silver in New York and London.

Year.	New York. Cents per fine ounce.	London. Pence per Standard ounce. (a)	Year.	New York. Cents per fine ounce.	London. Pence per Standard ounce. (a)
1908.....	52.864	24.402	1913.....	59.791	27.576
1909.....	51.503	23.726	1914.....	54.811	25.313
1910.....	53.486	24.670	1915.....	49.684	23.675
1911.....	53.304	24.592	1916.....	65.661	31.315
1912.....	60.835	28.042	1917.....	81.417	40.851

(a) 925 parts fine.

Average Monthly Prices of Silver.

Months.	New York.—Cents per fine ounce.							London. Pence per Standard ounce. (a)
	1911.	1912.	1913.	1914.	1915.	1916.	1917.	
January.....	53.795	56.260	62.938	57.572	48.855	56.775	75.630	36.682
February.....	52.222	59.043	61.642	57.506	48.477	56.755	77.585	37.742
March.....	52.745	58.375	57.870	58.067	50.241	57.935	73.861	36.410
April.....	53.325	59.207	59.490	58.519	50.250	64.415	73.875	36.963
May.....	53.308	60.880	60.361	58.175	49.915	74.269	74.745	37.940
June.....	53.043	61.290	58.990	56.471	49.034	65.024	76.971	39.065
July.....	52.630	60.654	58.721	54.678	47.519	62.940	79.010	40.110
August.....	52.171	61.606	59.293	54.344	47.163	66.083	85.407	43.418
September.....	52.440	63.078	60.640	53.290	48.680	68.515	100.740	50.920
October.....	53.340	63.471	60.793	50.654	49.385	67.855	87.332	44.324
November.....	55.719	62.792	58.995	49.082	51.714	71.604	85.891	43.584
December.....	54.905	63.365	57.760	49.375	54.971	75.765	85.960	43.052
Average for the year.....	53.304	60.835	59.791	54.811	49.684	65.661	81.417	40.851

(a) 925 parts fine. From "Engineering and Mining Journal," Jan. 12, 1918.

Important quantities of silver are being produced in Canada, both as fine metal and as silver bullion, ranging in fineness from 850 to 998.2. Fine silver is produced at Trail, B.C., by the Consolidated Mining and Smelting Company of Canada, Limited, being derived chiefly from the silver-lead ores of the Province, and finds a market in Canada, the United States and China.

In Ontario, ores from the Cobalt district are treated by the Coniagas Reduction Co., Thorold, Ontario; the Deloro Smelting and Refining Co., Deloro, Ontario; the Metals Chemical Co., Welland, Ontario; and the Standard Smelting and Refining Co., Chippewa, Ontario.

Silver bullion varying from 850 to 998.2 is produced at these works, other products being white arsenic, metallic nickel and cobalt, sulphate of nickel and cobalt, nickel and cobalt oxides, and mixed oxides. The silver bullion as a rule finds a market in the United States and in England.

Bullion shipped by these Ontario smelters in 1907 contained 4,449,722 fine ounces of silver; in 1908, 11,168,689 ounces; in 1911, 17,753,167 ounces; in 1913, 11,356,707 ounces; in 1915, 9,885,989 ounces; in 1916, 9,665,516 ounces, and in 1917, 6,450,075 fine ounces.

The bullion shipped from the mines and mills in the Cobalt district in 1917 is reported as 9,921,465 fine ounces, as against 8,551,070 ounces in 1916; 9,204,893 ounces in 1915, and 10,335,527 ounces in 1914.

Shipments to United States smelters in 1917 amounted to 7,347 tons with a silver content of 2,986,100 ounces, as against 7,180 tons containing 3,409,258 ounces in 1916, and 7,310 tons containing 3,769,308 ounces in 1915.

Exports and Imports.—The exports of silver as bullion or contained in ores, concentrates, etc., during 1917 were 21,718,784 fine ounces valued at \$17,621,398, as against 25,279,359 ounces valued at \$15,637,885 in 1916, and 27,672,481 ounces valued at \$13,812,038 in 1915.

The imports of silver bullion into Canada in 1917 were valued at \$959,153, as against \$875,157 in 1916 and \$337,254 in 1915. Silver is also imported as “manufactures of silver” and mention is made in the chapter on “Gold.”

Exports of Silver in Ore, etc.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
1886.....	\$ 25,957	1894.....	\$ 359,731	1902....	\$ 1,820,058	1910...	\$ 15,649,537
1887.....	206,284	1895.....	994,354	1903.....	1,989,474	1911.....	15,807,366
1888.....	219,008	1896.....	2,271,959	1904.....	1,904,394	1912.....	19,494,416
1889.....	212,163	1897..	3,576,391	1905.....	2,777,218	1913.....	21,441,220
1890.....	204,142	1898.....	2,902,277	1906....	5,686,444	1914.....	15,584,813
1891.....	225,312	1899.....	1,623,905	1907.....	9,941,849	1915.....	13,812,038
1892.....	56,686	1900.....	2,341,872	1908.....	12,403,482	1916.....	15,637,885
1893.....	213,695	1901....	2,026,727	1909.....	15,719,909	1917.....	17,621,398

Imports of Silver Bullion.*

Calendar Year.	Value.	Calendar Year.	Value.
1910.....	\$ 975,045	1914.....	\$ 629,279
1911.....	847,645	1915.....	337,254
1912.....	1,100,344	1916.....	875,157
1913.....	840,245	1917.....	959,153

* Silver imports are given more fully in the chapter on “Gold.”

Quebec.

The small quantity of silver credited to Quebec province for a number of years represents a small silver content of the pyritic ores mined at Eustis and Weedon, in the Eastern Townships, and the lead-zinc ores of Notre-Dames-des-Anges, Portneuf county. The production in 1917 was 136,194 fine ounces, valued at \$110,885, as against 98,610 ounces, valued at \$64,748 in 1915 and 63,450 ounces valued at \$31,524 in 1916.

Ontario.

The production of silver in Ontario increased from 17,777 fine ounces in 1903 to 2,451,356 fine ounces in 1905, and reached a maximum of 30,540,754 fine ounces in 1911. The maximum value, \$17,772,352, was reached in 1912.

The production in 1917 was 19,301,835 fine ounces valued at \$15,714,975, as against 21,608,158 fine ounces valued at \$14,188,133 in 1916, a decrease of 10.8 per

cent in quantity, but an increase of 10.7 per cent in value. In 1916 there had been also a decrease of 5.0 per cent in quantity and an increase of 15.5 per cent in value. The production included in addition to the production of the Cobalt and adjacent silver camps, 74,357 ounces contained in gold bullion and also a small recovery from copper ores.

The silver ores of the Cobalt district, which in the early days of the camp were all exported for treatment, are being reduced to an increasing extent each year within the camp by a combination of amalgamation cyanide process, with recovery of silver bullion. During 1917, 9,726,215 ounces, or 51.1 per cent of the output, was thus recovered as bullion in the district, while 6,450,075 ounces, or 33.9 per cent of the total was recovered by the silver smelters of the Province, so that over 16 millions, or 85 per cent of the Ontario production was recovered in the form of bullion within the Province, leaving a balance of 15.0 per cent treated in the United States. In 1916 about 39.5 per cent was recovered as bullion in the district and 44.7 per cent by the silver smelters, giving a total of 84.2 per cent as recovered in the form of bullion within the Province.

The following table shows the percentage production by the camp, by the southern Ontario smelters and from ores exported to the United States:—

	1914.	1915.	1916.	1917.
	%	%	%	%
Cobalt district.....	41.0	41.0	39.5	51.1
Ontario smelters.....	36.0	43.0	44.7	33.9
Total for Ontario.....	77.0	84.0	84.2	85.0
U.S. smelters ..	23.0	16.0	15.8	15.0
Total.....	100.0	100.0	100.0	100.0

Manitoba.

The silver production in Manitoba in 1917 amounted to 7,201 fine ounces valued at \$5,863 and was derived from the gold and copper ores of the new Pas district.

British Columbia.

The silver production of British Columbia based on smelter recoveries amounted in 1917 to 2,655,994 fine ounces valued at \$2,162,430, as against 3,392,872 ounces valued at \$2,227,794 in 1916, a decrease of over 21 per cent in quantity and of 3 per cent in value.

The chief sources of the silver production in this Province are the silver-lead ores of the East and West Kootenays, supplemented by the silver contained in the gold-copper ores of Rossland, the Boundary, and Coast districts.

Production of Silver in British Columbia by Districts, 1912-17.*

(Silver contents of ores shipped, in fine ounces.)

	1912.	1913.	1914.	1915.	1916.	1917.
Cariboo—						
Omineca division.....		46,298	135,265	79,155	112,635	82,311
Cassiar—						
Atlin.....					3,054	
Skeena, etc.....	5,868	4,714	131,509	175,179	256,802	343,805
Kootenay, East—						
Fort Steele division.....	376,918	362,311	492,080	481,258	509,693	180,168
Other divisions.....	7,405	4,756		1,188	29,178	79,685
Kootenay, West—						
Ainsworth division.....	301,755	477,015	329,586	239,565	321,202	224,461
Slocan division.....	1,657,105	1,841,226	1,775,975	1,812,550	1,480,571	1,547,576
Nelson division.....	164,182	129,011	150,268	9,405	32,547	46,229
Trail Creek division.....	87,530	109,585	136,185	159,584	132,080	47,112
Revelstoke, Trout Lake, and Lardeau.	43,536	23,397	11,295	16,740	22,419	37,733
Yale—						
Boundary.....	389,341	394,048	347,981	273,795	280,578	220,213
Similkameen Nicola.....		335	15	347	830	3,470
Yale, Ashcroft, and Kamloops.....		126	57	1,702	4,215	3,525
Lillooet.....		295	390	5		276
Coast and other districts.....	98,468	103,034	91,574	66,033	116,119	112,652
Total.....	3,132,108	3,465,856	3,602,180	3,366,506	3,301,923	2,929,216

*From the Minister of Mines Reports, British Columbia.

Yukon.

The silver production of the Yukon territory in 1917 amounted to 119,605 fine ounces valued at \$97,379, as against 360,101 ounces valued at \$236,466 in 1916, and 248,049 ounces valued at \$132,241 in 1915.

The comparatively large increase in the production for the past three years is due to the shipments of high grade silver-lead ores from the Silver King property in the Mayo area, north of the Stewart river, and to the activity in the copper mines in the Whitehorse district and the gold mines of the Conrad district.

In 1917, lode mining produced 66.8 per cent of the total output leaving 33.2 per cent as the production from the alluvial workings, as against 87 per cent from lode mining and 13 per cent from alluvial workings in 1916.

On an average about one ounce of silver is contained in each five ounces of crude bullion from the alluvial workings.

TIN.

Tin ores have not yet been found in sufficient quantities in Canada to be of economic importance.

The occurrence of tin ore has been reported from several localities, the most important, perhaps, being the discovery of cassiterite, near New Ross, Lunenburg county, Nova Scotia. Reports upon it may be found in the Summary Reports of the Geological Survey Branch of the Department of Mines for 1907, 1908, 1910, 1911, and 1912.

Tin has also been found in black sands in the Atlin district of British Columbia.

The imports of tin in 1917 were valued at \$5,656,665 and included tins in blocks, pigs and bars, 3,685,200 pounds valued at \$1,786,212; tin foil, bichloride of tin and strip waste valued at \$267,249; and tinware and crystals valued at \$3,603,204.

The imports of 1916 were valued at \$2,999,675, and included: tin in blocks, pigs and bars, 3,457,500 pounds, valued at \$1,372,200; tin foil, bichloride of tin and strip waste, \$1,544,420; and tinware and crystals, valued at \$1,311,482.

There is also a large annual import of tin plates and sheets, the quantity in 1917 being 133,351,700 pounds, valued at \$9,985,631, as against 115,084,900 pounds, valued at \$5,221,163, in 1916.

Annual Imports of Tin.

Calendar Year.	Tin in blocks, pigs and bars.		Tin foil.	
	Pounds.	Value.	Pounds.	Value.
1910.....	3,231,100	\$1,058,778	866,751	\$114,602
1911.....	4,047,500	1,623,670	1,531,877	176,602
1912.....	4,894,700	2,134,221	1,316,882	183,707
1913.....	5,085,700	2,252,324	1,074,131	138,779
1914.....	3,382,700	1,191,466	1,244,628	173,088
1915.....	2,912,600	1,009,597	1,002,413	151,599
1916.....	3,457,500	1,372,200	1,507,318	314,970
1917.....	3,685,200	1,786,212	938,217	266,725

Calendar Year.	(a) Tinware, etc.	Tin crystal.	Bichloride of tin.		Strip waste.	
	Value.	Value.	Pounds.	Value.	Pounds.	Value.
1910.....	\$ 389,040	\$ 3,903	31,219	\$3,846	.....	.....
1911.....	461,029	4,370	25,797	3,876	.....	.....
1912.....	540,599	6,308	36,045	5,595	.....	.....
1913.....	667,158	8,077	19,114	2,422	.....	.....
1914.....	650,987	7,759	200	29	.....	.....
1915.....	463,610	9,852	.....	.....	5,335	\$138
1916.....	1,301,008	10,474	81	48	37,021	975
1917.....	3,588,891	14,313	12	6	16,620	518

(a) Tinware, plain, japanned or lithographed, and all manufactures of tin, n.e.s.

TUNGSTEN.

The only important production of tungsten ore in Canada reported previous to 1918 is that of 1912, being 14 tons of concentrates produced by the Scheelite Mines, Ltd., of Moose River, N.S.

In 1917 a small test shipment of a few hundred pounds was made from Halifax county, N.S., and another from Dublin Gulch, Mayo district, Y.T., amounting in all to 580 pounds running 69.41 per cent WO_3 and netting \$234.

Early in 1918 the Acadia Tungsten Mines, Ltd., operating at Burnt Hill, N.B., shipped 15 tons of concentrates to New York.

Scheelite was discovered in Halifax county, N.S., in 1908, and reported on by E. R. Faribault in the Summary Report of the Geological Survey for 1908 and 1909. A concentrating mill was erected in 1912 by the Scheelite Mines, Ltd., operating the Moose River property in Nova Scotia.

The occurrence of wolframite was also noted by Dr. T. L. Walker in 1909 in association with molybdenite near the confluence of Burnt Hill brook and the Miramichi river, N.B. This property is now operated by the Acadia Tungsten Mines Company, which erected a concentrating mill during 1916.

The tungsten ore deposits were reported on by Dr. Walker in 1909¹, and the deposits in New Brunswick and Nova Scotia by Charles Camsell and Dr. D. D. Cairns in the Summary Report of the Geological Survey for 1916. The Burnt Hill mines of New Brunswick were also inspected in 1917 by J. C. Gwillim, acting for the Munition Resources Commission, Ottawa; who reported some tonnage of wolframite ore, but stated that the operators could not afford to produce concentrates at the official British price of 55 shillings per unit.

In British Columbia the Cariboo Chisholm Creek Mining Co. Ltd., Van Winkle, B.C., has been operating the old deposit on Hardscrabble Creek in the Cariboo district.

The occurrence of scheelite sands in the alluvial deposits of Dublin Gulch, Mayo district, Yukon, received a special mention by Dr. Cairns in the Summary Report of the Geological Survey for 1916.

Uses²:—"The metal tungsten is of primary importance because of certain valuable qualities it imparts to steel when alloyed with it. Its principal use at the present time is in the manufacture of high-speed tool steels so essential for the rapid production of all forms of projectiles, ordnance, and similar munitions.

"Tungsten has so far distanced its rival molybdenum in this particular field because supplies of its crude ores were more readily obtainable; but the known tungsten resources of the world are limited, and molybdenum production has increased several hundred per cent during the past two years, so that the relative importance of the two metals may eventually be reversed.

"Tungsten enters into the manufacture of armour plate, armour-piercing projectiles, gun liners, and aeroplane engines. It is also used in filaments for electric light bulbs. Alloyed with aluminium it is employed in automobile construction, and with aluminium and copper in propeller blades. It is an important constituent of a new tool alloy called "stellite". With molybdenum it forms an alloy in dentistry as a substitute for platinum."

Prices.—In 1915 the British Government commandeered all supplies of tungsten concentrates within the empire at a fixed price of 55 shillings (\$13.50) per unit (22.4 pounds) of contained tungstic acid. The price of ferro-tungsten (75 to 85 per cent and 1 per cent carbon max.) was 5s. 6d. (\$1.34) and that of tungsten powder was 6s. 3d. (\$1.52). Both were based on ore at 60 shillings and ruled from March till the end of the year.

The price of tungsten ore on the New York market was around \$17.00 per unit (20 pounds) for the first quarter of 1917, but the purchases made by France and Italy strengthened the market so that the price gradually raised to a maximum of \$28 in August and remained fairly well around \$26 for the remainder of the year.

¹ Report on the Tungsten Ores of Canada. By Dr. T. L. Walker, Mines Branch No. 25, 1909. (Publication out of print.)

² Report of the Canadian Munition Commission, Ottawa, 1918, p. 21.

ZINC.

Adding to the actual recoveries of refined zinc at Trail the estimated recoveries from ores shipped to United States smelters, we have a zinc production of 29,668,764 pounds, which at the average price of zinc for the year, 8.901 cents per pound, would be worth \$2,640,817. Of the total production thus recorded 1,786,740 pounds are credited to the Notre-Dame-des-Anges ores in Quebec and the balance, with the exception of a few thousand pounds from Alberta, is credited to British Columbia and amounted to 27,861,441 pounds.

In 1916 the production based on smelter recoveries was 23,364,760 pounds which, at the average price for the year 12.804 cents, was valued at \$2,991,623.

The total zinc ore shipments from the mines in 1917, including the zinc-lead ores from the Sullivan mine, East Kootenay, B.C., and ores exported, were about 116,489 tons, valued by the operators at \$1,323,985, and containing 64,655,713 pounds of zinc.

In 1916 the ore shipments were 82,077 tons valued by the operators at \$1,086,249 and containing 48,498,078 pounds of zinc.

A portion of the ores shipped to Trail in 1916 were not treated during the year and the percentage of zinc recovered at the Trail refinery in the early stages of operation was probably not as large as will be secured when the primary difficulties have been overcome.

The ores shipped contain also a varying silver content for which payment is made by the smelter and without which, on account of the import duty to the United States and the long rail haul, it would not in many cases pay to ship.

With the exception of a small production in experimental work there was no recovery of zinc spelter, or refined zinc in Canada previous to 1916. Hitherto the production of zinc has been recorded in terms of the tonnage of ore shipped and metal contents thereof. The establishment of an electrolytic refinery at Trail has placed the metallurgy of this metal in Canada on a similar basis to that of lead and copper, and it will now be in order to record the production accordingly. The production of refined zinc at Trail, in 1917, was 9,985 tons, as against 2,974 tons in 1916.

Annual Shipments of Zinc Ores.

Year.	Zinc ore shipped.		Metallic zinc in ore shipped.
	Tons.	Spot value.	Pounds.
1898	1,162	\$ 11,000	788,000
1899	865	18,165	814,000
1900	261	4,810	212,000
1901*			
1902	158	1,659	142,200
1903	1,000	10,500	900,000
1904	597	3,700	477,568
1905*	9,413	139,200	*
1906*	1,154	23,800	*
1907*	1,573	49,100	*
1908*	452	3,215	*
1909 (a)	18,371	242,699	16,468,204
1910	5,063	120,003	4,361,712
1911	2,590	101,072	2,346,849
1912	6,415	215,149	5,354,700
1913	7,889	186,827	7,069,800
1914	10,893	262,563	9,101,460
1915	14,895	554,938	12,231,439
1916	82,077	1,086,249	48,498,078
1917	116,489	1,510,262	64,655,713

*Figures not available.

(a) Includes 7,424 tons shipped late in 1908.

The zinc industry has been the subject of a special report in 1905 by a Commission appointed to investigate the zinc resources of British Columbia, and the conditions affecting their exploitation.¹

In 1916 a brief report was made by Dr. A. W. G. Wilson on the production of spelter in Canada, and conditions in connexion with the home treatment of British Columbia zinc ore.²

A report on the zinc-lead deposits of Notre-Dame-des-Anges was made by J. A. Bancroft and published in the Annual Report of the Bureau of Mines, Quebec, for 1915.³

The Provincial Bureau of Mines of Ontario, also published in 1916, a report on the lead and zinc deposits of Ontario and Eastern Canada.⁴

During 1913 the new United States customs tariff came into effect considerably reducing the duties payable on Canadian ore, the new items affecting Canadian shipments being:—

Zinc ores containing 25 per cent or more zinc: 10 per cent on zinc contained therein. Lead bearing ore: $\frac{3}{4}$ cent per pound on lead contained therein.

Although not paid for by the United States smelters, the lead in ore is considered as dutiable and as there is often a small lead content in the zinc ore or concentrates shipped, the lead duty applies. The result of the decreased duties has been a considerable increase in zinc shipments.

There is also a duty of 15 per cent on metallic zinc exported to the United States, and at present an import of $7\frac{1}{2}$ per cent on zinc and other materials imported into Canada from the United States.

Prices.—For the first quarter of 1917 the price of spelter remained around 10 cents but the effects of the over-production were eventually felt and the price gradually declined, closing the year at $7\frac{3}{8}$ cents per pound.

Average Price of Spelter in Cents per Pound at New York.*

Month.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
January	6.101	5.452	6.442	6.931	5.262	6.386	16.915	9.619
February.. ..	5.569	5.518	6.499	6.239	5.377	8.436	18.420	10.045
March	5.637	5.563	6.626	6.078	5.250	8.541	16.846	10.300
April	5.439	5.399	6.633	5.641	5.113	10.012	16.695	9.459
May	5.191	5.348	6.679	5.406	5.074	14.781	14.276	9.362
June.....	5.128	5.520	6.877	5.124	5.000	21.208	11.752	9.371
July	5.152	5.695	7.116	5.278	4.920	19.026	8.925	8.643
August	5.279	5.953	7.028	5.658	5.568	12.781	8.730	8.360
September	5.514	5.869	7.454	5.694	5.380	13.440	8.990	8.136
October.....	5.628	6.102	7.426	5.340	4.909	12.800	9.829	7.983
November.....	5.976	6.380	7.371	5.229	5.112	15.962	11.592	7.847
December.....	5.624	6.301	7.162	5.154	5.592	15.391	10.669	7.635
Year.....	5.520	5.758	6.943	5.648	5.213	13.230	12.804	8.901

* From the Engineering and Mining Journal, N.Y., Jan. 12, 1918.

¹ Mines Branch No. 12. Report of the Commission on the Investigation of the Zinc Resources of British Columbia, 1905. (Out of print.)

² Mines Branch No. 428. Report on the Production of Spelter in Canada, 1916, by Dr. A. W. G. Wilson.

³ Geology of part of the Township of Montauban and Chavigny, and of the Seigneurie de Grondines, by J. A. Bancroft, Annual Report of the Province of Quebec for 1915.

⁴ Lead and Zinc Deposits of Ontario and Eastern Canada, by W. L. Uglow, Annual Report of the Ontario Bureau of Mines for 1915. Vol. XXV, Part II.

Average Prices of Spelter, Ordinary Brands, in London.*

(In pounds per ton.)

Month.	1910.			1911.			1912.			1913.			1914.			1915.			1916.			1917.		
January	23	4	3	23	16	7	26	9	11	25	19	1	21	6	6	30	16	1	83	12	5	48	8	3
February	23	3	1	23	3	10	26	6	5	25	4	3	21	7	6	39	16	4	93	10	11	54	4	6
March	23	3	7	22	19	2	25	19	11	24	11	4	21	7	7	44	2	7	90	1	9	54	10	4
April	22	9	11	23	13	8	25	8	11	25	2	4	21	10	2	49	17	9	94	1	8	52	18	11
May	22	1	1	24	6	1	25	11	2	24	10	4	21	5	9	67	19	0	89	11	4	52	0	0
June	22	3	2	24	9	7	25	11	11	21	19	10	21	6	0	100	12	3	63	16	4	52	0	0
July	22	5	6	24	13	10	25	13	1	20	11	2	21	6	7	97	5	0	48	7	6	52	0	0
August	22	14	0	26	11	2	26	1	2	30	14	0	29	0	9	67	15	9	47	19	7	52	0	0
September	23	2	7	27	12	7	26	17	0	21	3	10	25	14	0	67	17	9	48	15	8	52	0	0
October	23	16	6	27	4	10	27	5	10	20	13	9	23	13	6	66	10	11	52	4	4	52	0	0
November	24	1	9	26	13	2	26	14	3	20	14	4	24	14	10	85	6	4	55	0	5	52	0	0
December	23	17	7	26	13	7	26	0	4	21	6	8	27	6	10	82	4	1	54	5	9	52	0	0
Year	23	0	0	25	3	2	26	3	3	22	14	3	23	6	8	66	13	8	68	8	11	52	3	6

* From the annual publication of the "Metal Information Bureau", London, E.C.

Imports.—The imports of zinc in 1917 amounted to 37,132,445 pounds valued at \$3,562,228 with also manufactures of zinc valued at \$79,044. The imports of brass, which alloy contains about 30 per cent zinc, were valued at \$1,277,249 and manufactures of brass valued at \$4,051,410.

The imports in 1916 were 29,999,838 pounds of zinc valued at \$3,642,476 with also manufactures of zinc valued at \$48,101. The imports of brass were valued at \$923,523 and the manufactures of brass at \$3,752,851.

The detailed imports for the last four years are given in the following table, with also the estimated zinc content of the zinc and brass products.

Summary of Imports of Zinc and Zinc Products, 1914-1917.

Zinc and Zinc Products.	1914.			1915.		
	Product in Pounds.	Value of Product.	Zinc Content in Pounds.	Product in Pounds.	Value of Product.	Zinc Content in Pounds.
Zinc, in blocks, pigs and sheets	3,160,900	\$ 189,785	3,160,900	1,653,700	\$ 226,104	1,653,700
" as spelter	10,845,400	551,031	10,845,400	14,265,700	1,784,471	14,265,700
" seamless tubing				100	27	100
" white (80% Zn.)	9,445,397	389,796	7,556,318	11,368,569	656,132	9,094,855
" dust (90% Zn.)	362,109	34,295	325,898	503,143	70,823	452,829
" sulphate and chloride of (44% Zn.)	352,715	9,390	155,195	379,545	16,090	167,000
Total	24,166,521	1,174,297	22,043,711 (11,021·8 tons)	28,170,757	2,753,647	25,634,184 (12,817·1 tons)
" as manufacture of		36,355			21,711	
Brass, in blocks, pigs and ingots (30% Zn.)	1,010,600	126,357	303,180	1,677,800	* 226,499	503,340
" old and scrap (30% Zn.)	1,407,900	150,346	422,370	311,900	41,971	93,570
" tubing (30% Zn.)	1,590,573	314,675	477,172	1,381,482	349,988	414,445
" plain wire	370,407	59,984	111,122	439,766	95,952	131,930
" bars and rods (free) (30% Zn.)	1,747,700	235,656	524,310			
Total	6,127,180	937,018	1,838,154 (919·1 tons)	3,810,948	714,410	1,143,285 (571·6 tons)
Brass, bars and rods		94,827			215,782	
" strips, sheets or plates		110,733			234,590	
" wire cloth n.o.p.		120,614			147,464	
" cups for manuf. of shells		124,622			435,161	
" caps for electric batteries		5,684			5,367	
" hand-pumps		11,956			10,930	
" nails, tacks, etc.		6,736			7,562	
" other manufactures n.o.p.		1,445,898			1,406,676	
Total		1,921,070			2,463,532	

Summary of Imports of Zinc and Zinc Products, 1914-1917.—*Concluded.*

Zinc and Zinc Products.	1916.			1917.		
	Product in Pounds.	Value of Product.	Zinc Content in Pounds.	Product in Pounds.	Value of Product.	Zinc Content in Pounds.
Zinc, in blocks, pigs and sheets.....	1,624,600	\$ 267,750	1,624,600	2,975,700	\$ 450,161	2,975,700
" as spelter.....	13,214,800	1,873,605	13,214,800	17,139,600	1,686,568	17,139,600
" seamless tubing.....						
" white (80% Zn.)....	14,171,673	1,314,629	11,327,338	16,039,236	1,301,405	12,831,389
" dust (90% Zn.).....	691,704	162,186	622,534	547,158	91,699	492,442
" sulphate and chloride of (44% Zn.).....	297,061	24,306	130,707	430,751	32,395	189,530
Total.....	29,999,838	3,642,476	26,919,979 (13,460 tons)	37,132,445	3,562,228	33,628,661 (16,814.3 tons)
" as manufacture of...		48,101			79,044	
Brass, in blocks, pigs and ingots (30% Zn.)...	736,000	163,540	220,800	1,191,300	307,740	357,390
" old and scrap (30% Zn.).....	848,300	183,611	254,640	1,192,700	279,032	357,810
" tubing (30% Zn.)...	993,119	411,539	297,936	1,053,010	431,277	315,903
" plain wire "	396,757	164,833	119,027	525,947	259,200	157,784
" bars and rods (free) (30% Zn.).....						
Total.....	2,974,676	923,523	892,403 (446.2 tons)	3,962,957	1,277,249	1,188,887 (594.4 tons)
Brass, bars and rods...		362,318			493,859	
" strips, sheets or plates.....		242,101			354,908	
" wire cloth n.o.p....		266,202			454,163	
" cups for manuf. of shells.....		1,059,678			442,599	
" caps for electric batteries.....		6,985			13,265	
" hand-pumps.....		22,795			41,325	
" nails, tacks, etc....		13,796			11,023	
" other manufactures n.o.p.....		1,778,976			2,240,268	
Total.....		3,752,851			4,051,410	

Imports of Zinc in Blocks, Pigs, etc.

Calendar Year.	In blocks, pigs and sheets.		As spelter.		As manufactures of zinc.	Seamless tubing.	
	Cwt.	Value.	Cwt.	Value.	Value.	Pounds.	Value.
1907.....	30,130	\$ 198,570	58,430	\$ 348,810	\$ 21,812	670	\$ 53
1908.....	24,273	130,689	54,780	254,225	14,577		
1909.....	35,283	199,016	120,615	592,148	16,073		
1910.....	31,660	191,051	109,084	561,170	21,829		
1911.....	33,678	206,859	116,996	654,097	30,862		
1912.....	100,095	617,836	117,845	686,585	46,336		
1913.....	47,226	291,368	126,051	661,207	54,898		
1914.....	31,609	189,785	103,454	551,031	36,355		
1915.....	16,537	226,104	142,657	1,784,471	21,711	100	27
1916.....	16,246	267,750	132,148	1,873,605	48,101		
1917.....	29,757	450,161	171,396	1,686,568	79,044		

Imports of Zinc White, Zinc Dust, and Zinc Sulphate and Chloride.

Calendar Year.	Zinc white.		Zinc dust.		Zinc, sulphate and chloride of.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1910	8,496,399	\$ 312,779	97,461	\$ 4,859	237,466	\$ 6,470
1911	8,537,498	314,194	86,242	5,718	414,500	15,930
1912	10,505,944	425,714	308,239	18,944	941,780	29,104
1913	12,682,126	525,643	412,294	26,403	634,634	17,424
1914	9,445,397	389,796	362,109	34,295	352,715	9,390
1915	11,368,569	656,132	503,143	70,823	379,545	16,090
1916	14,171,673	1,314,629	691,704	162,186	297,061	24,306
1917	16,039,236	1,300,621	547,158	91,699	430,751	32,395

Consumption.—The table of imports shows that in 1917, 16,814 tons of zinc were imported as zinc and zinc products with also 594 tons of zinc in brass and approximately 1,100 tons as zinc contents of manufactures of zinc and brass, or a total of 18,498 tons, which, added to the 9,985 tons of zinc refined in Canada, the output of the Trail refinery, would give a total consumption of 28,483 tons, as against 18,000 tons in 1916 and 14,000 in 1915.

It is probable, however, in the case of zinc, as has already been shown for steel, copper, and lead, that there have been other imports besides those recorded under the usual classification, and that the actual consumption during the last few years was greater than the above estimate. Information from other sources would bring the consumption to about 41,000 tons for 1917.

There are now in Canada three companies constructing, or operating electrolytic plants, viz.: The Electro Zinc Company, formerly at Welland, Ontario, and now at Shawinigan Falls, Que., which uses the Watt's process; the French Complex Ore Reduction Company at Nelson, B.C., using the French process; and the Consolidated Mining and Smelting Co., of Canada, Ltd., at Trail, B.C., which company has erected a large plant and is increasing its capacity so as to treat, it is reported, about 70 tons per day.

In 1917 the operations, with the exception of the Trail plant, were still in the experimental stages of development.

The plant of the Electro Zinc Co. was designed to recover refined zinc ores from Notre-Dame-des-Anges, Quebec.

The French Complex Ore Reduction Co. established a plant at Nelson, after the Provincial Government had guaranteed its bonds to the amount of \$40,000, and was reported to be in a position to start operations early in 1917, but was unable to do so, owing to financial difficulties. Early in 1918, the Provincial Government guaranteed bonds to the extent of another \$25,000 to permit the company to resume operations.

The Trail plant of the Consolidated Mining and Smelting Co. started regular commercial operations early in 1916, and in July it was reported to be producing 20 tons per day. Later in the year, the company undertook to increase its capacity to 45 tons. Early in 1917 it was reported to be producing 45 tons per day and its capacity is now rated at 70 tons.

Bounties.—An Act to provide for the payment of bounties on zinc produced from zinc ores mined in Canada was passed by the House of Commons of Canada, May 3, 1916. This Act was cited as "The Zinc Bounties Act, 1916".

A new Act was passed by the House of Commons of Canada, May 24, 1918, and reads as follows:—

"An Act to provide for the payment of bounties on zinc produced from zinc ores mined in Canada."

His Majesty, by and with the advice and consent of the Senate and House of Commons of Canada enacts as follows:—

1. This Act may be cited as The Zinc Bounties Act, 1918.

2. Whenever it appears to the satisfaction of the Minister of Trade and Commerce who is charged with the administration of this Act, that the standard price of zinc or spelter in cakes, blocks or pigs, in London, England, or St. Louis, United States, as the Minister of Trade and Commerce may determine, is less than nine cents per pound, the Governor in Council may authorize the payment out of the Consolidated Revenue Fund of a bounty on zinc or spelter, containing not more than two per centum of impurities, produced in Canada, at the time the price is as hereinbefore stated, from zinc ores mined in Canada. Such bounty shall be equal to the difference between such standard price per pound and nine cents per pound, but shall in no case exceed two cents per pound, and in no event shall any bounty be paid when the price received for such zinc or spelter by the producer is nine cents or more per pound.

3. No bounty shall be payable under this Act on zinc or spelter produced after the thirty-first day of July, one thousand nine hundred and twenty.

4. The total amount payable under the provisions of this Act shall not exceed the sum of \$400,000.

5. The Governor in Council may make regulations for carrying out the provisions of this Act.

Production of Zinc in British Columbia by Districts, 1912-1917.*

(Contents of ore shipped in pounds.)

	1912.	1913.	1914.	1915.	1916.	1917.
Kootenay, East—						
Fort Steele division.....				180,000	14,840,000	20,715,090
Windermere—Golden.....	142,643			311,719	210,000	18,000
Kootenay, West—						
Ainsworth.....		150,680	280,000	678,940	625,971	918,601
Nelson.....			332,003	3,127,209	3,470,036	982,309
Slocan.....	5,215,637	6,608,088	7,254,464	8,684,572	17,854,357	18,789,573
Revelstoke, etc.....						33,279
Boundary-Yale—						
Kamloops, etc.....						27,564
Cariboo—						
Omineca.....					168,616	364,097
	5,358,280	6,758,768	7,866,467	12,982,440	37,168,980	41,848,513

* From the Minister of Mines Reports, British Columbia.

World's Production of Spelter, in Short Tons.*

Country.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.
Australia.....	1,198		560	1,904	2,531	4,105	5,616 (c)	7,500	
Austria and Italy.....	14,063	13,931	14,666	18,602	21,609	23,928			
Belgium.....	181,851	184,194	190,233	215,050	220,678	217,928			
France and Spain.....	61,512	61,859	65,191	79,791	79,543	78,289 (a)	12,944 (a)	8,497	
Germany.....	239,062	242,594	251,046	276,008	298,794	312,075			
Great Britain.....	60,029	65,422	69,531	73,803	63,086	65,197			
Holland.....	19,017	21,548	23,121	25,059	26,380	26,811	18,098	12,243	
Japan.....							6,554	23,421	
Poland.....	9,740	8,758	9,514	10,952	9,659	8,389 (c)	7,000		
United States.....	210,424	255,760	269,184	286,526	338,806	346,676	353,049	489,519	
Norway.....				7,363	8,959	10,237 (b)	10,028 (b)	17,349	
Total.....	796,896	854,066	893,046	986,058	1,070,045	1,093,635			

* Mineral Resources of the United States. (a) Sain onl . (b) For Sweden. (c) Estimated.

World's Consumption of Spelter, in Short Tons.*

Country.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.
Austria-Hungary..	35,935	36,155	37,258	47,950	51,588	44,533			
Belgium.....	74,956	71,209	84,326	81,240	85,098	84,216			
France.....	85,869	73,744	62,059	90,389	90,389	89,286			
Germany.....	198,634	207,343	203,374	241,734	248,899	255,734			
Great Britain.....	152,669	171,408	195,989	193,674	204,146	214,508			
Holland.....	4,189	4,409	4,409	4,409	4,409	4,409			
Italy.....	9,259	9,039	8,929	11,133	11,795	12,015			
Russia.....	19,621	20,282	27,447	31,856	30,754	36,707			
Spain.....	5,512	4,960	4,630	5,291	5,181	6,503			
United States.....	214,167	270,730	245,884	280,059	340,372	295,370			
Other countries....	11,023	9,921	13,669	19,621	21,715	23,038			
Total.....	811,834	879,200	887,974	1,007,356	1,094,346	1,066,319			

* Mineral Resources of the United States.

Electrolytic Zinc Plants in Canada.

Company.	Location of plant.	Remarks.
Consolidated Mining and Smelting Co. of Canada, Ltd.....	Trail, B.C.....	Capacity of plant, 45 tons of refined zinc per day being increased to 70 tons per day.
Electro Zinc Company, Ltd.....	Shawinigan Falls, Que.	Experimental in 1916. Small plant for recovery of zinc from zinc oxide.
French Complex Ore Reduction Company.....	Nelson, B. C.....	Experimental. Small demonstration plant at Nelson, B.C.

Electrolytic Zinc Plants in the United States.*

Company.	Location of plant.	Daily spelter capacity.	Remarks.
American Smelting and Refining Co..	Omaha, Nebr.....	Experimental. ...	Operated in 1915.
" " "	Garfield, Utah.....	10 tons.....	Planned.
Anaconda Copper Mg. Co.....	Anaconda, Mont..	25 tons.....	Under construction: 10 tons operated in 1915.
" " "	Great Falls, Mont.	100 tons.....	Under construction.
Bully Hill Copper Co.....	Bully Hill, Cal....	{ Experimental ..	Operated in 1915.
		{ 10 tons.....	Under construction,
Daly-Judge Mining Co.....	Park City, Utah...	15 tons.....	" " "
Electrolytic Zinc Co.....	Baltimore, Md....	10 tons.....	" " " 2½ tons
			now in operation.
Mammoth Copper Mg. Co.....	Kennett, Cal.....	Experimental....	Operated in 1915.
Northwestern Metals Co.....	Helena, Mont....	Ore capacity 100 tons.....	Malm process: not operated in 1915.
Reed Zinc Co.....	Palo Alto, Cal....	Experimental....	Operated in 1914-15.
River Smelting and Refining Co.....	Keokuk, Iowa....	".....	Operated in 1915.
Western Metals Co.....	Georgetown, Colo.	Ore capacity 100 tons.	Malm process: under construction.

* As published by the United States Geological Survey, April 4, 1916.

Active Zinc Smelters in the United States, and Capacity in 1916, by Companies and States.*

Company.	Location.	Acid Plants.	Retorts at close of 1915.	Retorts June 30, 1916.	Additional retorts contemplated or under construction.
Fort Smith Spelter Co.	Fort Smith, Ark.			2,560	
Arkansas Zinc Co.	Van Buren, "			2,400	
United States Zinc Co.	Pueblo, Colo.		2,208	1,944	
American Zinc Co. of Illinois	Hillsboro, Ill.	A	4,000	4,864	
Collinsville Zinc Sm. Co.	Collinsville, "		1,792	2,304	
Granby Mg. & Sm. Co.	E. St. Louis, "	A	3,220	3,220	2,400
Hegeler Zinc Co.	Danville, "	A	3,600	5,400	
Illinois Zinc Co.	Peru, "	A	4,640	4,640	800
Matthiesson & Hegeler Zinc Co.	La Salle, "	A	6,168	6,168	
Missouri Zinc Co.	Beckemeyer, "		352	352	
Mineral Pt. Zinc Co.	Depue, "	A	9,068	9,068	
National Zinc Co.	Springfield, "	A	3,200	4,480	
Robt. Lanyon Z. & Acid Co.	Hillsboro, "	A	1,840	3,200	
Sandoval Zinc Co.	Sandoval, "		672	672	
American Spelter Co.	Pittsburg, Kan.		896	992	
American Zinc, Lead & Smelting Co.	Caney, "		6,080	6,080	
" " "	Dearing, "		4,480	4,480	
Chanute Spelter Co.	Chanute, "		1,280	1,280	
Cherokee Smelting Co.	Bruce, "		896	896	
Edgar Zinc Co.	Cherryvale, "		4,800	4,800	
Granby Mg. & Sm. Co.	Neodesha, "		3,760	3,760	
Iola Zinc Co.	Concreto, "		660	1,320	
Joplin Ore & Spelter Corporation	Pittsburg, "		1,444	1,792	
Lanyon Smelting Co.	" "		448	448	
Owen Zinc Co.	Caney, "		1,280	1,280	640
Pittsburg Zinc Co.	Pittsburg, "		910	910	
Prime Western Spelter Company.	Gas, "	A	4,868	4,868	
U. S. Smelting Co.	Altoona, "		3,960	4,600	
" " "	Iola, "		3,440	3,440	
" " "	La Harpe, "		1,924	1,924	
Weir Smelting Co.	Weir, "				418
Edgar Zinc Co.	St. Louis, Miss.		2,000	2,000	
Miss. Zinc Sm. Co.	Rich Hill, "			448	
Nevada Smelting Co.	Nevada, "		672	672	
Bartlesville Zinc Co.	Bartlesville, Okla.		5,184	6,336	
" " "	Blackwell, "			1,600	4,800
" " "	Collinsville, "		10,752	13,440	
(Lanyon-Starr Plant)	Bartlesville, "		3,456	3,456	
Eagle-Picher Lead Co.	Henryetta, "				4,000
Henryetta Spelter Co.	" "			3,000	
J. B. Kirk Gas & Sm. Co.	Checotah, "			2,560	2,560
Kusa Spelter Co.	Kusa, "		3,720	3,720	
La Harpe Spelter Co.	" "			4,000	
National Zinc Co.	Bartlesville, "		4,970	4,970	
Oklahoma Spelter Co.	Kusa, "			1,600	
Quinton Spelter Co.	Quinton, "				1,340
Tulsa Fuel & Mg. Co.	Collinsville, "		6,232	6,232	
U. S. Zinc Co.	Sand Springs, "		5,680	8,000	
American Steel & Wire Company	Donora, Penn.	A	3,648	9,120	
American Zinc & Chemical Co.	Langeloth, "	A	3,648	6,384	
N. J. Zinc Co. (of Pennsylvania)	Palmerston, "		6,720	6,960	
Clarksburg Zinc Co.	Clarksburg, W. Va.		3,648	3,648	
Grasselli Chemical Co.	" "	A	5,760	5,760	
" " "	Meadowbrook, "	A	8,592	8,592	
United Zinc Smelting Corporation.	Moundsville, "	A			6,912
Total, for all States.			156,568	196,640	24,812
Plants with special retorts:—					
Michael Hayman & Co., Buffalo, N.Y.			12	12	
Trenton Sm. & Refining Co., Trenton, N.J.			96	60	
Wm. Cramp & Sons Ship & Engine Bldg. Co., Philadelphia, Pa.			32	32	

*United States Geological Survey, Press Bulletin No. 285, August, 1916.

NON-METALLIC PRODUCTS.

ABRASIVES.

The abrasives produced in Canada are: corundum, the various sandstone abrasives, as grindstones, pulpstones, scythestones, etc., and tripolite, or infusorial earth. Artificial abrasives including aluminous abrasives made from imported bauxite and the carbide abrasives are also manufactured in considerable quantity.

Corundum.

The total sales of grain corundum produced from Canadian corundum ores in 1917, were 375,938 pounds valued at \$32,153, or an average of 8.55 cents per pound. The 1916 sales were 134,811 pounds valued at \$10,307, or an average of 7.65 cents per pound. Although the 1917 production was nearly three times that of the previous year the production is now much less than was obtained during the years from 1905 to 1913.

The grain corundum recovered in 1917 was obtained from 4,659 tons of rock milled, representing a recovery of 4.0 per cent. In the earlier days of the industry from 6 to 10 per cent of the rock milled was recovered in the form of grain corundum. During the recent years a much lower grade of rock has been milled.

Statistics of annual production are given in the following table:—

Production of Corundum Ore and Corundum.

(IN SHORT TONS).

Calendar Year.	Corundum-bearing rock treated.	Grain corundum graded.	% Recovery	Grain corundum sold in Canada.	Grain corundum exported.	Total of grain corundum	Value.	Average price, cents per pound.
1900.....		60		3		3	\$ 300	5.00
1901.....	4,134	444	10.7	85	302	387	46,415	5.97
1902.....	7,996	806	10.1	106	662	768	84,465	5.49
1903.....	(a) 8,877	839	9.5	85	618	703	77,510	5.51
1904.....	28,187	1,654	5.9	116	877	993	109,545	5.51
1905.....	23,571	1,681	7.1	140	1,504	1,644	149,153	4.48
1906.....	45,719	2,914	6.4	162	2,112	2,274	204,973	4.50
1907.....	60,532	2,682	4.4	164	1,728	1,892	177,922	4.70
1908.....	2,678	106	4.0	99	990	1,089	100,398	4.60
1909.....	35,894	1,579	4.4	129	1,362	1,491	162,492	5.45
1910.....	37,183	1,686	4.5	106	1,764	1,870	198,680	5.31
1911.....	41,975	1,641	3.9	92	1,390	1,472	161,873	5.50
1912.....	36,879	1,620	4.4	63	1,897	1,960	239,091	6.10
1913.....	12,290	763	6.2	23	1,154	1,177	137,036	5.82
1914.....	12,111	695	5.7	14	534	548	72,176	6.59
1915.....	1,724	116	6.7	21	240	262	33,138	6.33
1916.....	1,864	67	3.6	8	59	67	10,307	7.65
1917.....	4,659	188	4.0	16	172	188	32,153	8.55
Total.....						18,788	1,997,627	

(a) In addition to this amount which was milled in Canada, 267 tons of ore were mined and shipped to the United States for treatment there.

Corundum is found in an area embracing several townships in Renfrew and Hastings counties in the Province of Ontario. The industry made its appearance there in 1900, the production reaching a maximum in 1906. From 1907 to 1913 the yearly production was smaller, but fairly uniform.

Grindstones, Pulpstones, Etc.

The total production of grindstones, pulpstones, and scythestones in 1917 was 2,523 tons valued at \$45,754, as against a production in 1916 of 3,478 tons valued at \$52,782.

The production of abrasives has been a long established industry in Nova Scotia and New Brunswick and insofar as output is concerned has remained practically stationary for many years.

The grindstones are shipped chiefly in a finished condition and are marketed in Canada, Newfoundland, and United States, the prices ranging in 1917 from \$14 to \$26 per ton.

A number of pulpstones are usually made each year. Scythestones both finished and in the rough are also shipped as well as occasionally small quantities of grit for marble polishing.

Annual Production of Grindstones.

Calendar Year.	Nova Scotia.		New Brunswick.		Total.		Average value per ton.
	Tons.	Value.	Tons.	Value.	Tons.	Value.	
1886.....	1,765	\$ 24,050	2,255	\$ 22,495	4,020	\$ 46,545	11 58
1887.....	1,710	25,020	3,582	38,988	5,292	64,008	12 10
1888.....	1,971	20,400	3,793	30,729	5,764	51,129	8 87
1889.....	712	7,128	2,692	23,735	3,404	30,863	9 07
1890.....	850	8,536	4,034	33,804	4,884	42,340	8 67
1891.....	1,980	19,800	2,499	22,787	4,479	42,587	9 51
1892.....	2,462	27,610	2,821	23,577	5,283	51,187	9 69
1893.....	2,112	21,000	2,488	17,379	4,600	38,379	8 34
1894.....	2,128	16,000	1,629	16,717	3,757	32,717	8 71
1895.....	1,400	14,000	2,075	17,932	3,475	31,932	9 19
1896.....	1,450	14,500	2,263	18,810	3,713	33,310	8 97
1897.....	1,407	17,500	3,165	24,840	4,572	42,340	9 26
1898.....	1,422	12,350	3,513	32,425	4,935	44,775	9 07
1899.....	1,378	10,300	3,133	32,965	4,511	43,265	9 59
1900.....	1,411	12,600	4,128	40,850	5,539	53,450	9 65
1901.....	358	3,200	4,223	42,490	4,581	45,690	9 97
1902.....	1,074	8,118	3,559	36,000	4,633	44,118	9 52
1903.....	1,337	9,562	4,201	38,740	5,538	48,302	8 72
1904.....	1,029	7,332	3,620	35,450	4,649	42,782	9 20
1905.....	1,020	10,200	4,520	52,175	5,540	62,375	11 25
1906.....	1,023	9,680	4,340	50,134	5,363	59,814	11 15
1907.....	551	4,480	4,863	55,896	5,414	60,376	11 15
1908.....	473	4,803	3,370	43,325	3,843	48,128	12 52
1909.....	312	3,204	3,963	51,460	4,275	54,664	12 79
1910.....	387	3,496	3,586	43,700	3,973	47,196	11 88
1911.....	380	3,382	4,186	49,560	4,566	52,942	11 59
1912.....	374	3,760	4,038	48,330	4,412	52,090	11 81
1913.....	350	4,900	4,487	46,425	4,837	51,325	10 61
1914.....	350	5,270	3,626	49,234	3,976	54,504	13 71
1915.....	285	5,300	2,295	30,468	2,580	35,768	13 86
1916.....	273	5,800	3,205	46,982	3,478	52,782	15 18
1917.....	375	9,875	2,148	35,879	2,523	45,754	18 13
Total.....					142,7409	1,507,437	

The value of exports of grindstones finished and in the rough during 1917 according to the Department of Customs records is \$31,304 including finished stone valued at \$29,242, and rough stone 310 tons valued at \$2,062. The exports of grindstones in 1916 were valued at \$44,942 including finished stone valued at \$43,178 and rough stone valued at \$1,764.

The greater proportion of the Canadian production of grindstones is exported. To meet Canadian requirements, in Ontario and Quebec chiefly, there were imported during 1917, grindstones to the value of \$185,607; burrstones 519 valued at \$910; emery \$79,176; manufactures of emery \$553,660; pumice stone \$34,162; sandpaper \$331,776; iron sand for glass or polishing, or for sawing stone \$36,737; artificial abrasives valued at \$112,614, or a total value of \$1,334,642.

Exports of Grindstones.*

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
1906.....	\$ 31,978	1909.....	\$ 13,942	1912.....	\$ 26,535	1915.....	\$ 36,234
1907.....	32,534	1910.....	23,502	1913.....	54,867	1916.....	44,942
1908.....	19,721	1911.....	29,206	1914.....	24,407	1917.....	31,304

* Including stone for the manufacture of grindstones.

Imports of Abrasive Materials.

Calendar Year.	Grindstones. Value.	Burrstones. (c) Value.	Emery. (a) Value.	Mfs. of emery. (b) Value.	Pumice stone. (d) Value.	Iron Sand. (e) Value.	Sandpaper. (f) Value.
1910.....	\$ 71,394	\$ 854	\$ 40,400	\$ 92,890	\$ 14,829	\$ 6,647	\$ 148,384
1911.....	123,356	1,642	46,274	104,170	18,779	8,340	164,474
1912.....	112,020	1,409	46,616	130,571	21,310	13,347	189,782
1913.....	145,247	1,784	48,995	135,654	17,861	10,168	171,516
1914.....	98,872	16	29,127	88,881	16,976	13,743	138,415
1915.....	79,391	314	67,067	139,665	18,814	3,263	133,677
1916.....	122,291	648	50,666	317,053	34,554	15,641	247,317
1917.....	185,607	910	79,176	553,660	34,162	36,737	331,776

(a) Emery in bulk, crushed or ground, duty free.

(b) Emery and carborundum wheels and manufactures of emery or carborundum.

(c) Burrstones in blocks, rough or unmanufactured, not bound up or prepared by binding into millstones.

(d) Pumice and pumice stone, ground or unground. Duty free.

(e) Iron sand or globules for polishing glass or granite, or for sawing stone. Duty free.

(f) Sandpaper, glass, flint, and emery paper or emery cloth.

Tripolite.

The shipments of tripolite in 1917 were reported as 600 tons valued at \$18,000, as compared with shipments in 1916 of 620 tons valued at \$12,139.

The shipments from year to year have varied considerably and in some seasons the producing companies shipped from stock only.

From 1902 to the present Nova Scotia has been the only province from which shipments of tripolite have been made. At the present time the principal operator is the Oxford Tripolite Company operating in Colchester county. The crude product is dried and treated in a small mill.

A brief review of the uses of tripolite together with a list of the principal known Canadian occurrences was published in the Annual Report on Mineral Production for 1914.

Annual Shipments of Tripolite.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
1896.....	644	\$ 9,960	1904.....	320	\$ 6,400	1911.....	20	\$ 122
1897.....	15	150	1905.....	300	3,600	1912.....	38	230
1898.....	1,017	16,660	1906.....	Nil.	Nil.	1913.....	620	12,138
1899.....	1,000	15,000	1907.....	30	225	1914.....	650	13,000
1900.....	336	1,950	1908.....	30	195	1915.....	317	12,119
1901.....	850	15,300	1909.....	Nil.	Nil.	1916.....	620	12,139
1902.....	1,052	16,470	1910.....	22	134	1917.....	600	18,000
1903.....	835	16,700						

Artificial Abrasives.

The production of artificial abrasives has grown to considerable proportions during the past two years, the location of the industry being the Niagara district where large quantities of electric power were available and recently a plant has been under construction at Shawinigan Falls, Quebec.

Silicon carbide abrasives known under special trade names are now manufactured at three plants. Carbolon is manufactured by the Exolon Company at Thorold, Ont.; Crystolon as manufactured by the Norton Company at Chippewa, Ont.; and Carborundum by the Canadian Aloxite Company at Shawinigan Falls, Que. These abrasives are made with coke and pure silica which are reduced in a special type of electric furnace devised for this particular purpose.

Artificial corundum, or aluminous abrasives, are made from bauxite imported from the Southern States. Coke and iron are added and the charge is fused in an electric furnace. The elimination of the silica from the ore results in the production of a by-product of low grade ferro-silicon.

The aluminous abrasives obtained include: "Aloxite" manufactured by the Canadian Aloxite Company (The Carborundum Co.) at Niagara Falls, Ont.; "Alundum" manufactured by the Norton Company, at Chippewa, Ont.; "Exolon" manufactured by the Exolon Company at Thorold, Ont.; "Coralox" manufactured by D. A. Brebner, Ltd., at Hamilton, Ont.; and artificial corundum manufactured by the National Abrasive Company at Hamilton, Ont. (plant moved to Niagara Falls, Ont., in 1918). Practically all of the crude aluminous abrasive made in Canada is sent to the finishing plants in the United States.

The total production of artificial abrasives at both United States and Canadian plants, as collected and published by the United States Geological Survey, was in 1916, 38,841 short tons, valued at \$2,935,909. This record includes the production of crushed steel abrasives as well as the carbide and aluminous abrasives.

"The total marketed production of artificial abrasives made from United States domestic bauxite in 1917 (U.S. Geol. Sur. Rep. "Bauxite and Aluminium" 1917) was 48,460 short tons, valued at \$6,970,000 approximately, or about \$144 a short ton. This is an increase over the production in 1916 of 58 per cent in quantity and of 200 per cent in value. The average value is variable, however, in that the prices received for the product depend upon many factors among which hardness, size of grain, degree of finishing and many others may be mentioned."

ACTINOLITE.

There was no mining of actinolite reported in 1917, but shipments from stock are reported as 120 tons valued at \$1,320, the value being that of the material after it has been milled and prepared for market.

Production of actinolite in Canada has been confined to Elzevir and Kaladar townships in Hastings and Addington counties, Province of Ontario, the centre for the industry being the village of Actinolite. The earliest operations date back to about 1883. For a time deposits were worked only at intervals long apart when sufficient rock was broken to meet the demand for several subsequent years.

Actinolite is used as an ingredient for a coal-tar roofing compound, the grinding of the crude material being done in such a way as not to destroy the fibre.

The only shipper in recent years is the Actinolite Mining Company of Bloomfield, New Jersey, U.S.A., which owns deposits of actinolite in Kaladar and Elzevir townships, and a mill for grinding the same at Actinolite, Ontario.

Annual Production of Actinolite.

Calendar Year.	Tons.	Value.	Average Price.	Calendar Year.	Tons.	Value.	Average Price.
1897.....	205	\$1,845	.....	1911.....	67	\$ 736	\$ 11 00
1899.....	57	4,872	.....	1912.....	92	1,000	10 87
1900.....	303	.....	.....	1913.....	66	720	10 91
1901.....	521	3,126	.....	1914.....	119	1,304	10 96
1902.....	550	4,400	.....	1915.....	220	2,420	11 00
1903.....	550	3,108	.....	1916.....	250	2,750	11 00
1909.....	Nil.	Nil.	.....	1917.....	120	1,320	11 00
1910.....	30	330	\$11 00				

ARSENIC.

The total production of arsenic in 1917 was 2,936 tons valued at \$669,431 and included 2,656 tons of crude and refined arsenious oxide valued at \$658,231 and 280 tons of arsenic contained in arsenical gold concentrates, valued at \$11,200. The production in 1916 was 2,186 tons of crude and refined arsenious oxide valued at \$262,349.

Canada's production of white arsenic up to 1903 was secured from a plant at Deloro, Ontario, which treated mispickel residues from which the gold content had been extracted by amalgamation, and bromo-cyanide treatment. Since 1903 though, even in spite of a bounty offered in 1907 by the Ontario Government on "white arsenic, otherwise known as arsenious oxide, produced from mispickel ores, and not from ores carrying smaltite, niccolite, or cobaltite," the industry has been dormant.

In 1906 plants treating cobalt ores made provision for the recovery of white arsenic as a by-product, and since then white arsenic has been produced each year, the production for the last five years being fairly constant in quantity. On this white arsenic no bounty is payable.

From 1907 to 1909 there were small shipments of arsenical ore concentrates from Nova Scotia for the arsenic contents. The Headly Gold Mine in the Similkameen district of British Columbia has for a number of years been shipping considerable quantities of arsenical gold concentrates to Tacoma in the State of Washington for the recovery of gold. It was not until 1917 that an arsenic recovery plant was installed. During the last four months of that year a small payment was made for arsenic contained in concentrates shipped.

The exports of white arsenic in 1917 according to Customs records were 4,572,400 pounds (2,286 tons) valued at \$507,898, as compared with exports in 1916 of 3,950,500 pounds (1,975 tons) valued at \$197,458.

The imports of white arsenic or arsenious oxide in 1917 were 247,610 pounds valued at \$32,083 as compared with 41,090 pounds valued at \$7,086 in 1916.

Imports of sulphide of arsenic in 1917 were 252,848 pounds, valued at \$22,053, as compared with imports in 1916 of 239,991 pounds valued at \$11,839.

There were also imported during 1917 arseniate, bi-arseniate and stannate of soda to the amount of 4,469 pounds valued at \$588, as compared with 15,779 pounds valued at \$1,228 in 1916.

Annual Production of Arsenic.

Calendar Year.	White Arsenic.		Calendar Year.	Arsenical Ore.		White Arsenic.	
	Tons.	Value.		Tons.	Value.	Tons.	Value.
1885.....	440	\$ 17,600	1903.....			257	\$ 15,420
1886.....	120	5,460	1904-5.....				
1887.....	30	1,200	1906.....			201	14,058
1888.....	30	1,200	1907.....	656	\$ 11,094	330	36,209
1889.....	Nil.	Nil.	1908.....	986	17,506	715½	41,060
1890.....	25	1,500	1909.....	224	3,346	1,129	64,100
1891.....	20	1,000	1910.....	547	5,716	1,502	75,328
1892-3.....	Nil.	Nil.	1911.....			2,097	76,237
1894.....	7	420	1912.....			2,045	89,262
1895-8.....	Nil.	Nil.	1913.....			1,692	101,463
1899.....	57	4,872	1914.....			1,737	104,015
1900.....	303	22,725	1915.....			2,396	147,830
1901.....	695	41,676	1916.....			2,186	262,349
1902.....	800	48,000	1917.....		11,200	2,656	658,231

Exports of White Arsenic.

Calendar Year.	Pounds.	Value.	Calendar Year.	Pounds.	Value.
1908.....	1,913,732	\$ 43,493	1913.....	2,606,767	\$ 107,094
1909.....	3,111,249	119,673	1914.....	3,751,900	132,567
1910.....	4,512,673	173,932	1915.....	4,636,400	174,190
1911.....	4,125,558	81,761	1916.....	3,950,500	197,458
1912.....	3,847,906	101,310	1917.....	4,572,400	507,898

Imports of Arsenious Oxide and Sulphide of Arsenic.

Calendar Year.	Arsenious oxide.*		Arsenic, sulphide of*		Total
	Pounds.	Value.	Pounds.	Value.	
1907.....	622,888	\$ 42,245	64,014	\$ 4,249	\$ 46,494
1908.....	127,942	4,043	302,970	12,754	16,797
1909.....	23,857	1,285	309,141	12,371	13,656
1910.....	260,415	6,891	257,451	8,946	15,837
1911.....	7,338	158	330,170	6,665	6,823
1912.....	76,528	1,722	451,928	19,431	21,153
1913.....	18,788	1,061	455,394	17,759	18,820
1914.....	5,012	249	11,494	756	1,005
1915.....	14,222	657	171,993	5,415	6,072
1916.....	41,090	7,086	239,991	11,839	18,925
1917.....	247,610	32,083	252,848	22,053	54,136

*Duty free.

Imports of Arseniate, Bi-Arseniate and Stannate of Soda.

Calendar Year.	Pounds.	Value.
1907.....	307,247	\$ 3,919
1908.....	7,617	468
1909.....	22,889	975
1910.....	26,174	549
1911.....	47,532	1,908
1912.....	41,977	1,595
1913.....	22,892	987
1914.....	14,389	604
1915.....	9,090	503
1916.....	15,779	1,228
1917.....	4,469	588

ASBESTOS.

The total output of asbestos in 1917 including crude and milled fibre was 141,743 tons as compared with 118,247 tons in 1916. The total sales, excluding asbestic in 1917 were 135,502 tons valued at \$7,183,099, or an average of \$53.01 per ton, as compared with sales in 1916 of 133,439 tons valued at \$5,199,797, or an average of \$38.97 per ton. Sales of asbestic in 1917 were 18,279 tons valued at \$47,284, as against 20,710 tons valued at \$29,072 in 1916.

The quantity of asbestos in stock on December 31, 1917, was reported as 13,339.6 tons valued at \$1,215,484, or an average of \$91.81 per ton, as compared with stocks on hand at the end of 1916 amounting to 6,289 tons valued at \$393,335, or an average of \$62.54 per ton.

The average number of men employed in mines and mills during 1917 was 3,114 at a wage cost of \$2,312,110, as compared with 2,821 men in 1916 at a wage cost of \$1,659,913.

The total quantity of asbestic rock milled during 1917 was 2,260,191 tons, which with a mill production of 135,475 tons shows an average estimated recovery of 6.0 per cent. In 1916 the recovery was 6.19 per cent and in 1915, 5.71 per cent.

Asbestos production in Canada has for many years been confined to the Eastern Townships district of the Province of Quebec; Black Lake, Thetford, Robertsonville, Danville, and East Broughton being the shipping points. Other occurrences are known, but hitherto these have not proved of economic interest.

A serpentine area in the Porcupine gold district of Ontario has been under development from which some trial shipments have recently been made.

In earlier reports of this series a classification of asbestos production was made on the basis of the reported values of the products, the milled asbestos being subdivided into grades Nos. 1, 2, and 3. Owing to the lack of any recognized system of classification of product on the part of the producers, this arbitrary division of the annual product did not appear to be very satisfactory particularly in view of the great changes in price taking place during the past two years. The production has, therefore, been reported in two grades only, viz.: crude fibre, and milled fibre.

Output, Sales, and Stocks of Asbestos in 1917.

	Output.	Sales.			Stock on hand, December 31.		
	Tons.	Tons.	Value.	Per ton.	Tons.	Value.	Per ton.
Crude.....	6,268	5,383.4	\$2,748,071	\$ 510 47	1,322.6	\$ 738,195	\$ 558 14
Mill Stock.....	135,475	130,119	4,435,028.	34 08	11,917	477,289	40 05
Total asbestos.....	141,743	135,502.4	7,183,099	53 01	13,239.6	1,215,484	91 81
Asbestic.....		18,279	47,284	2 59			

Output, Sales, and Stocks of Asbestos in 1916.

	Output.	Sales.			Stock on hand, December 31.		
	Tons.	Tons.	Value.	Per ton.	Tons.	Value.	Per ton.
Crude.....	5,415	5,886	\$1,866,969	\$ 317 19	444	\$ 138,415	\$ 311 75
Mill Stock.....	112,832	127,553	3,332,828	26 13	5,845	254,920	43 61
Total asbestos.....	118,247	133,439	5,199,797	38 97	6,289	393,335	62 54
Asbestic.....		20,710	29,072	1 40			

Annual Shipments of Asbestos and Asbestic.

Calendar Year	Asbestos.			Asbestic.		
	Short tons.	Value.	Per ton.	Short tons.	Value.	Per ton.
1880 (a).....	380	\$ 24,700	\$ 65 00			
1881 (a).....	540	35,100	65 00			
1882 (a).....	810	52,650	65 00			
1883 (a).....	955	68,750	71 99			
1884 (a).....	1,141	75,097	65 82			
1885 (a).....	2,440	142,441	58 38			
1886 (a).....	3,458	206,251	59 64			
1887.....	4,619	226,976	48 92			
1888.....	4,404	255,007	57 90			
1889.....	6,113	426,554	69 78			
1890.....	9,860	1,260,240	127 81			
1891.....	9,279	999,878	107 76			
1892.....	6,082	390,462	64 20			
1893.....	6,331	310,156	86 81			
1894.....	7,630	420,825	55 15			
1895.....	8,756	368,175	42 05			
1896.....	10,892	423,066	38 84	1,358	\$ 6,790	\$ 5 00
1897.....	13,202	399,528	29 99	17,240	45,840	2 66
1898.....	16,124	475,131	29 47	7,661	16,066	2 10
1899.....	17,790	468,635	26 34	7,746	17,214	2 22
1900.....	21,621	729,886	33 76	7,520	18,545	2 47
1901.....	32,892	1,248,645	37 96	7,325	11,114	1 52
1902.....	30,219	1,126,688	37 28	10,197	21,631	2 20
1903.....	31,129	915,888	29 42	10,548	13,869	1 31
1904.....	35,611	1,213,502	34 08	12,854	12,850	1 00
1905.....	50,669	1,486,359	29 33	17,594	16,900	0 96
1906.....	60,761	2,036,428	33 52	21,424	23,715	1 11
1907.....	62,130	2,484,767	39 99	28,296	20,275	0 72
1908.....	66,548	2,555,361	38 40	24,225	17,974	0 74
1909.....	63,349	2,284,587	36 06	23,951	17,188	0 72
1910.....	77,508	2,555,974	32 98	24,707	17,629	0 71
1911.....	101,393	2,922,062	28 82	26,021	21,046	0 81
1912.....	111,561	3,117,572	27 95	24,740	19,707	0 80
1913.....	136,951	3,830,909	27 97	24,135	19,016	0 79
1914.....	96,542	2,892,266	29 96	21,031	17,540	0 83
1915.....	111,142	3,553,166	31 97	25,700	21,819	0 85
1916.....	133,439	5,199,797	38 97	20,710	29,072	1 40
1917.....	135,502	7,183,099	53 01	18,279	47,284	2 59

(a) Exports.

Annual Shipments of Crude and Mill Stock Asbestos.

Calendar Year.	Crude.			Mill Stock.		
	Short tons.	Value.	Per ton.	Short tons.	Value.	Per ton.
1903.....	3,134	\$ 361,867	\$ 115 46	27,995	\$ 554,021	\$ 19 79
1904.....	4,410	534,874	121 28	31,201	678,628	21 75
1905.....	3,767	472,859	125 53	46,902	1,013,500	21 61
1906.....	3,841	635,345	165 41	56,920	1,401,083	24 61
1907.....	4,327	830,632	191 97	57,803	1,654,135	28 62
1908.....	3,345.5	669,232	200 04	63,202	1,886,129	29 84
1909.....	3,074.3	575,510	187 20	60,275	1,709,077	28 35
1910.....	3,740	664,508	177 66	73,768	1,891,466	25 64
1911.....	4,864.1	744,962	153 15	96,529	2,177,100	22 55
1912.....	5,662.9	890,351	157 23	105,898	2,227,221	21 03
1913.....	5,660.3	989,162	174 75	131,291	2,841,747	21 64
1914.....	4,147.9	773,193	186 42	92,394	2,119,073	22 94
1915.....	5,370	1,076,297	200 43	105,772	2,476,869	23 42
1916.....	5,886	1,866,969	317 19	127,553	3,332,828	26 13
1917.....	5,383.4	2,748,071	510 47	130,119	4,435,028	34 08

Exports and Imports.

Exports of asbestos in 1917 are reported 93,932 tons, valued at \$4,903,326, as compared with exports in 1916 of 96,775 tons, valued at \$3,872,463. There were also exports of asbestic sand and waste in 1917 amounting to 52,088 tons, valued at \$430,956, as compared with 33,564 tons, valued at \$241,272 in 1916. Manufactured asbestos was exported in 1917 to the value of \$55,666, as compared with exports in 1916, valued at \$4,741.

Export of Canadian Asbestos by Countries 1903-1917.

Calendar Year.	To Great Britain		To United States.		To Germany.		To other Countries.		Total		Value per ton.
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	
1903.....	2,743	\$ 40,120	24,252	\$ 714,781	1,429	\$ 25,150	3,356	\$110,982	31,780	\$ 891,033	\$ 28 04
1904.....	6,602	210,175	25,957	762,300	2,463	94,141	2,250	94,271	37,272	1,160,887	31 15
1905.....	9,731	305,056	29,696	811,080	2,969	100,061	4,635	169,918	47,031	1,386,115	29 47
1906.....	9,435	318,313	39,767	1,058,513	3,654	82,117	6,998	230,314	59,854	1,689,257	28 22
1907.....	5,432	200,909	44,861	1,312,582	225	8,195	6,235	147,613	56,753	1,669,299	29 41
1908.....	5,221	288,290	50,503	1,314,337	341	9,470	5,145	230,666	61,210	1,842,783	30 11
1909.....	5,227	204,978	45,675	1,243,795	693	17,706	5,376	263,378	56,971	1,729,857	30 36
1910.....	6,700	280,452	57,939	1,505,477	440	15,925	6,406	306,778	71,485	2,108,632	29 50
1911.....	7,511	192,993	62,551	1,732,541	361	20,494	4,697	121,231	75,120	2,067,259	27 52
1912.....	9,387	208,464	69,222	1,871,770	1,155	43,898	8,244	225,221	88,008	2,349,353	26 69
1913.....	7,220	211,861	78,157	2,120,314	840	36,491	17,595	479,381	103,812	2,848,047	27 43
1914.....	11,197	382,482	58,302	1,555,339	2,749	94,967	8,833	265,858	81,081	2,298,646	28 35
1915.....	21,930	744,006	56,656	1,722,144	.....	.....	5,998	268,545	84,584	2,734,695	32 33
1916.....	14,369	615,426	73,197	2,830,044	.....	.....	9,209	426,993	96,775	3,872,463	40 02
1917.....	*	.....	.....	.....	.....	.....	.....	.....	93,932	4,903,326	52 20

*Not published separately in 1917.

Canada, though the leading country in the world in the production of asbestos, does not yet manufacture all the asbestos goods needed to supply the domestic market. Consequently, there is a considerable importation annually of asbestos goods under the Customs classification of "Asbestos in any form other than crude, and all manufactures thereof," the duty being 25 per cent.

Annual Imports of Asbestos.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
1910.....	\$ 230,849	1912.....	\$ 461,449	1914.....	\$ 282,053	1916.....	\$334,670
1911.....	319,815	1913.....	520,082	1915.....	168,894	1917*.....	537,431

*Asbestos in any form other than crude, and manufactures of. Duty, 25 per cent.

BARYTES.

Shipments of ground barytes in 1917 were 3,490 tons, valued at \$54,027 as compared with 1,368 tons valued at \$19,393 in 1916.

During recent years the only barytes deposit worked in Canada has been that at Lake Ainslie, Inverness county, N.S. In the Province of Ontario, however, a deposit located in Langmuir township, south of Porcupine, has been under development during the past three years by The Premier Langmuir Mines, Ltd., and shipments therefrom will be made during 1918.

Annual Production of Barytes.

Calendar Year.	Tons.	Value.	Value per ton.	Calendar Year.	Tons.	Value.	Value per ton.
1885.....	300	\$ 1,500	\$ 5 00	1901.....	653	\$ 3,842	\$ 5 89
1886.....	3,864	19,270	4 98	1902.....	1,096	3,957	3 61
1887.....	400	2,400	6 00	1903.....	1,163	3,931	3 38
1888.....	1,100	3,850	3 50	1904.....	1,382	3,702	2 68
1899.....				1905.....	3,360	7,500	2 23
1890.....	1,842	7,543	4 09	1906.....	4,000	12,000	3 00
1891.....				1907.....	1,344	3,000	2 23
1892.....	315	1,260	4 00	1908.....	4,312	19,021	4 41
1893.....				1909.....	179	1,120	6 26
1894.....	1,081	2,830	2 62	1910.....			
1895.....				1911.....	50	400	8 00
1896.....	145	715	4 93	1912.....	464	5,104	11 00
1897.....	571	3,060	5 36	1913.....	641	5,410	11 00
1898.....	1,125	5,533	4 92	1914.....	612	6,169	10 08
1899.....	720	4,402	6 11	1915.....	550	6,875	12 50
1900.....	1,337	7,605	5 69	1916.....	1,368	19,393	14 17
				1917.....	3,490	54,027	15 48

Imports of barytes are not separately shown in the Customs classification. There have been small shipments of barium peroxide for the manufacture of hydrogen peroxide amounting in 1917 to 73 tons, valued at \$17,393, as compared with 57 tons, valued at \$26,172 in 1916, and 18 tons, valued at \$5,250, in 1915. There is also a small import of artificial sulphate of barium known as blanc fixé, the imports, however, being included with satin white. The imports of blanc fixé and satin white in 1917 were 3,600 tons, valued at \$90,482.

Blanc fixé (barium sulphate) is artificially prepared by treating a solution of barium salt, generally the chloride with sulphuric acid, or aluminium sulphate. It is used for coating papers.

Satin white is an artificially prepared mineral for coating paper, consisting of precipitated calcium sulphate and alumina, prepared by grinding together the necessary proportions of alum and slaked lime with sufficient water.

Imports of Blanc Fixé and Satin White.

Calendar Year.	Tons.	Value.	Average.
1910.....	1,016	\$ 22,726	\$ 22 37
1911.....	1,315	29,796	22 66
1912.....	1,635	34,794	21 28
1913.....	1,698	38,043	22 40
1914.....	1,854	39,849	21 49
1915.....	2,746	59,471	21 66
1916.....	3,747	86,306	23 03
1917.....	3,600	90,482	25 13

CHROMITE.

The production of chromite in the Eastern Townships of the Province of Quebec has been greatly stimulated by the demand created by the war for use as a refractory lining in steel furnaces and in the manufacture of ferro-chrome. The cutting off of supplies from Austria and Greece and the restrictions through shipping shortage of the quantities available from Rhodesia and New Caledonia have resulted in the development of chrome deposits on the American Continent particularly in California and in Quebec.

From 1910 to 1914 inclusive, the Canadian industry had been dormant, but in 1915 shipments of 12,341 tons averaging less than 35 per cent Cr_2O_3 were made. This was increased in 1916 to 15,249 tons valued at \$310,902 (final shipments of ore and custom concentrates) having an average content of 38.3 per cent Cr_2O_3 and an average value of \$20.39 per ton.

In 1917 the final shipments of ores and concentrates were 23,712 tons valued at \$581,796, or an average of \$24.54 per ton, and containing an average of about 35.7 per cent Cr_2O_3 .

The 1917 shipments included 20,154 tons of ore that would vary from 30 per cent to 40 per cent Cr_2O_3 but would probably average close to 32 per cent; and 3,558 tons of concentrates that would average about 50 per cent Cr_2O_3 .

The figures given in the table of production for 1916 and 1917 represent the quantities and values of material as shipped by the mine operators. A portion of this is concentrated in a Custom Mill thus reducing the tonnage and increasing the value of the final shipments.

Of the total shipments in 1917 about 965 tons were marketed for consumption in Canada.

Annual Production of Chromite in Canada.

Calendar Year.	Short tons.	Value.	Average price.	Calendar Year.	Short tons.	Value.	Average price.
1886.....	60	\$ 945	\$ 15 75	1904.....	6,074	\$ 67,146	\$ 11 05
1887.....	38	570	15 00	1905.....	8,575	93,301	10 88
1888 to.....	{No output}			1906.....	9,035	91,859	10 17
1893.....				1907.....	7,196	72,901	10 13
1894.....	1,000	20,000	20 00	1908.....	7,225	82,008	11 35
1895.....	3,177	41,300	13 00	1909.....	2,470	26,604	10 77
1896.....	2,342	27,004	11 53	1910.....	299	3,734	12 49
1897.....	2,637	32,474	12 31	1911.....	157	2,587	16 48
1898.....	2,021	24,252	12 00	1912.....	{No output}		
1899.....	2,010	21,842	10 86	1913.....			
1900.....	2,335	27,000	11 56	1914.....	136	1,210	8 90
1901.....	1,274	16,744	13 14	1915.....	12,341	179,543	14 55
1902.....	900	13,000	14 44	1916.....	(a) 27,517	311,460	11 32
1903.....	3,509	51,129	14 57	1917.....	(a) 36,725	499,682	13 61

(a) A portion of this ore was sold to customs mill in the district and the final shipments of ores and concentrates were in 1916, 15,249 short tons valued at \$310,902 or an average of \$20.39 per ton; and in 1917, 23,713 tons valued at \$581,796 or an average of \$24.54 per ton.

Prices for 40 per cent chromite ore varied during 1917 from 85 cents per unit, per short ton in January to a maximum of \$1.25 per unit in December.

The exports of chromite in 1917 as reported by the Customs Department were 19,229 tons valued at \$342,528, or an average of \$17.81 per ton, as compared with exports in 1916 of 12,633 tons valued at \$152,532, or an average of \$12.07 per ton.

Small quantities of ferro-chrome have been imported into Canada but there is no separate record of the quantities thereof. The imports of bichromate of soda in 1917 were 1,333,564 pounds valued at \$248,621 as compared with 1,421,589 pounds valued at \$362,571 in 1916. The imports of bichromate of potash in 1917 were 20,260 pounds valued at \$6,697, as against imports in 1916 of 31,049 pounds valued at \$13,381.

Imports of Chromite into the United States from Canada.¹

Twelve Months Ending June 30.	Short Tons.	Value.	Twelve Months Ending June 30.	Short Tons.	Value.
1904.....	2,790	\$ 36,322	1911.....	17	\$ 150
1905.....	6,489	70,934	1912.....	14½	258
1906.....	9,951	107,580	1913.....	Nil.	.....
1907.....	6,179	66,115	1914.....	597	9,283
1908.....	6,505	69,009	1915.....	399	4,202
1909.....	4,455	50,042	1916.....	17,677	194,591
1910.....	269	2,892	1917.....	16,519	271,052

¹The Foreign Commerce and Navigation of the United States, Washington, long ton in original changed to short ton.

COAL.

The term "production" in the text and tables of this report is used to represent the tonnage of coal actually sold, or used, by the producer, as distinguished from the term "output," which is applied to the total coal extracted from the mine, and which includes, in some cases, coal lost or unsaleable, or coal carried into stock on hand at the end of the year.

The production of coal during 1917 was 14,046,759 short tons (12,541,749 long tons), valued at \$43,199,831, or an average of \$3.08 per ton, as compared with a production in 1916 of 14,483,395 short tons (12,931,603 long tons), valued at \$38,817,841, or an average of \$2.68 per ton, a falling off in production in 1917 of 436,636 tons, or a little over 3 per cent.

The average number of men employed during 1917 was 24,596, and total wages paid \$25,963,520, as compared with an average of 23,611 men employed in 1916 and \$20,884,236 paid in wages.

The values of the production in 1917 have, for all provinces been furnished directly by the operators. In 1916 and previous years, however, complete returns of values were not received from all operators, and the values placed upon the coal production in the provinces of Nova Scotia and British Columbia were partially estimated, or assumed.

The peculiar situation which exists in respect to Canada's fuel supply, viz.: That notwithstanding the enormous resources which Canada possesses in coal, over 50 per cent of our consumption is imported from the United States, has been pointed out and explained annually in these reports. The Canadian coal-fields are situated in the extreme east and in the western provinces, while the great central Provinces of Ontario and Quebec, the chief centres of population, are more easily and economically supplied with coal from the nearer coal-fields of Pennsylvania and Ohio. Further, there is no anthracite coal in eastern Canada and we have grown dependent upon the anthracite output of Pennsylvania for that most desirable of the domestic fuels, which is not only the chief domestic, or house fuel in Manitoba, Ontario, and Quebec, but is imported even into our eastern coal-districts.

Such a condition of international trade attracts little attention during normal times, and it is only under conditions such as those that have been brought about by the great war that the importance of the situation and its possibilities are realized. In round numbers Canada produced during 1917 about 14 million tons of coal, of which 1.7 million tons were exported, and imported 15.5 million tons of bituminous coal and 5.3 million tons of anthracite. During the previous year, 1916, we produced in round numbers 14.5 million tons, exported 1.7 million tons, and imported 13 million tons of bituminous coal, and 4.5 million tons of anthracite, thus, while production fell off, the imports were considerably increased.

The total consumption of coal in 1917 was 33,123,735 tons, as compared with 29,865,856 tons in 1916, and 23,906,692 tons in 1915.

Production of Coal by Provinces, 1917.

Province.	Average No. of men employed.	Wages paid.	Production of Coal.			Per cent of total quan- tity.
			Short tons.	Value.	Average per ton.	
		\$		\$	\$	
Nova Scotia.....	10,283	10,406,170	6,327,091	19,410,737	3 068	45.04
New Brunswick.....	390	375,379	189,095	708,010	3 744	1.35
Saskatchewan.....	434	318,980	355,445	662,451	1 86	2.53
Alberta.....	8,350	8,906,315	4,736,368	14,153,685	2 99	33.72
British Columbia.....	5,126	5,945,176	2,433,888	8,235,716	3 383	17.33
Yukon Territory.....	13	11,500	4,872	29,232	*6 00	0.03
Total.....	24,596	25,963,520	14,046,759	43,199,831	3 08	100.00

* Estimated.

Production of Coal by Provinces, 1916.

Province.	Average No. of men employed.	Wages paid.	Production of Coal.			Per cent of total quan- tity.
			Short tons.	Value.	Average per ton.	
		\$		\$	\$	
Nova Scotia.....	10,851	8,161,297	6,912,140	18,514,662	2 68	47.73
New Brunswick.....	327	212,332	143,540	386,016	2 69	0.99
Saskatchewan.....	409	234,986	281,300	441,836	1 57	1.94
Alberta.....	7,060	6,813,209	4,559,054	11,386,577	2 50	31.48
British Columbia.....	4,949	5,451,912	2,584,061	8,075,190	3 12½	17.84
Yukon Territory.....	15	7,500	3,300	13,200	4 00	0.02
Total.....	23,611	20,884,236	14,483,395	38,817,481	2 68	100.00

Comparison of Production, 1915 with 1916, and 1916 with 1917.

Province.	(i) Increase or (d) Decrease.			
	Years 1915 and 1916.		Years 1916 and 1917.	
	Short tons.	p. c.	Short tons.	p. c.
Nova Scotia.....	(d) 551,230	7.39	(d) 585,049	8.46
New Brunswick.....	(i) 16,149	12.68	(i) 45,555	31.74
Saskatchewan.....	(i) 41,193	17.16	(i) 74,145	26.39
Alberta.....	(i) 1,198,236	35.65	(i) 177,314	3.89
British Columbia.....	(i) 518,448	25.10	(d) 150,173	5.81
Yukon Territory.....	(d) 6,424	66.06	(i) 1,572	47.64
Total for Canada.....	(i) 1,216,372	9.17	(d) 436,636	3.01

It will be noted that the Provinces of Nova Scotia and British Columbia each showed a smaller production than the previous year, whereas in New Brunswick, Saskatchewan and Alberta, an increase is shown, the net result being a total falling off amounting to 436,636 tons.

The total production in 1917 includes 108,225 tons of anthracite, or less than 1 per cent of the total; 11,154,251 tons of bituminous, or 79 per cent of the total, and 2,784,283 tons of lignite, or nearly 20 per cent of the total.

The consumption of coal during the year includes approximately 5,428,423 tons of anthracite; 24,911,029 tons of bituminous, and 2,784,283 tons of lignite.

The total output, production and distribution of coal mined by provinces during 1916 and 1917 is shown in the following tables:—

Production and Distribution of Coal Mined, by Provinces, 1917.

(IN SHORT TONS.)

—	Nova Scotia.	New Brunswick.	Saskatchewan.	Alberta.	Yukon.	British Columbia.	Total.
Sold in Canada.....	4,681,709	171,309	334,625	4,231,325	4,480	1,046,020	10,469,468
Sold for export to U.S.....	353,142	13,372	.....	90,289	.....	845,128	1,301,881
Sold for export to other countries.....	258,264	.....	.....	.....	.....	42,796	301,060
Total sales.....	5,293,115	184,681	334,625	4,321,564	4,480	1,933,944	12,072,409
Used by producers in making coke, steel, brick, etc.....	306,374	.....	3,000	102,609	.....	278,590	690,573
Used by producers for colliery consumption and by workmen.....	727,602	4,414	17,820	312,195	392	221,354	1,283,777
Total used.....	1,033,976	4,414	20,820	414,804	392	499,944	1,974,350
Production*.....	6,327,091	189,095	355,445	4,736,368	4,872	2,433,888	14,046,759
Stock on hand Jan. 1.....	47,904	501	.....	15,776	.....	20,160	84,341
" " Dec. 31.....	49,777	1,014	.....	10,417	.....	15,373	76,581
Difference.....	+ 1,873	+ 513	.....	- 5,359	.....	- 4,787	- 7,760
Losses due to breakage or other causes.....	16,371	60	5,178	142,628	392	231,733	296,362
Total output.....	6,345,335	189,668	360,623	4,873,637	5,264	2,660,834	14,435,361

* Production is obtained by adding coal sold and coal used.

Production and Distribution of Coal Mined, by Provinces, 1916.

(IN SHORT TONS.)

—	Nova Scotia.	New Brunswick.	Saskatchewan.	Alberta.	Yukon.	British Columbia.	Total.
Sold in Canada.....	5,226,902	135,683	263,781	4,113,403	3,000	958,761	10,701,530
Sold for export to U.S.....	446,038	4,723	1,725	60,164	.....	938,425	1,451,075
Sold for export to other countries.....	277,607	.....	.....	.....	.....	6,906	284,513
Total sales.....	5,950,547	140,406	265,506	4,173,567	3,000	1,904,092	12,437,118
Used by producers in making coke, steel, brick, etc.....	285,892	.....	1,750	67,106	.....	450,066	804,814
Used by producers for colliery consumption and by workmen.....	675,701	3,134	14,044	318,381	300	229,903	1,241,463
Total used.....	961,593	3,134	15,794	385,487	300	679,969	2,046,277
Production*.....	6,912,140	143,540	281,300	4,559,954	3,300	2,584,061	14,483,395
Stock on hand Jan. 1.....	85,750	526	20	9,412	.....	36,521	132,229
Stock on hand Dec 31.....	48,477	584	49	13,632	.....	15,960	78,702
Difference.....	- 37,273	+ 58	+ 29	+ 4,220	.....	- 20,561	- 53,527
Losses due to breakage or other causes.....	37,128	60	12,935	113,759	.....	221,953	385,835
Total output.....	6,911,995	143,658	294,264	4,677,033	3,300	2,785,453	14,815,703

* Production is obtained by adding coal sold and coal used.

Distribution of Coal Mined during the Years 1912-13-14-15.

(IN SHORT TONS.)

	1912.	1913.	1914.	1915.
Sold in Canada	10,572,365	11,381,960	10,359,390	9,826,712
Sold for export to United States.....	1,537,585	1,255,401	1,181,536	1,330,718
" other countries.....	314,410	263,189	239,927	297,343
Total sales.....	12,424,360	12,900,550	11,780,853	11,454,773
Used by producers for the manufacture of coke.....	870,885	914,421	591,331	701,975
" by colliery consumption, and workmen.....	1,217,584	1,197,207	1,265,345	1,110,275
Production.....	14,512,829	15,012,178	13,637,529	13,267,023
Stock on hand Jan. 1.....	314,742	385,456	325,275	270,499
" Dec. 31.....	282,069	500,477	242,152	171,205
Difference.....	- 32,673	+ 115,021	- 83,123	- 99,294
Loss due to washing, breakage, or other causes.	167,291	405,679	434,337	312,467
Total output.....	14,647,447	15,532,878	13,988,743	13,480,196

A record of the monthly production of coal by provinces is given in the following tables which shows the decreased production in Alberta and British Columbia during the months of April, May, and June due to the strikes that took place in what is known as District No. 18, during those months.

The production in Nova Scotia, New Brunswick, British Columbia, and the Yukon is all bituminous coal, that of Saskatchewan all lignite, while the production in Alberta includes the three classes, semi-anthracite, bituminous and lignite. A record of the monthly production of these three classes of coal in Alberta will be found in the section of this report dealing with that Province.

A record of the monthly production of coal during a part of the year 1918 is also given hereunder.

Monthly Production of Coal in Canada by Provinces, 1917.

(IN SHORT TONS.)

Month.	Nova Scotia.	New Brunswick.	Saskatchewan.	Alberta.	British Columbia.	Total.
January.....	533,111	17,144	37,693	492,958	188,552	1,269,458
February.....	468,589	16,634	27,890	448,664	209,894	1,171,671
March.....	485,864	17,351	22,932	453,175	242,452	1,221,774
April.....	490,764	14,963	13,471	210,284	161,307	890,789
May.....	505,008	13,700	18,051	100,199	159,706	796,664
June.....	585,454	13,881	21,688	103,243	154,280	878,546
July.....	575,667	14,832	20,380	357,314	192,976	1,161,169
August.....	600,974	14,514	27,255	490,760	214,431	1,347,934
September.....	535,660	15,120	27,642	457,892	211,518	1,257,576*
October.....	578,572	16,697	40,063	543,193	232,271	1,410,796
November.....	538,019	16,629	51,622	592,083	240,156	1,438,509
December.....	429,409	17,630	46,758	486,603	226,345	1,206,745
Total.....	6,327,091	189,095	355,445	4,736,368	2,433,888	14,046,759*

*Includes 4,872 tons produced in the Yukon district.

Production of Coal in Canada by Provinces, 1918.

(IN SHORT TONS.)

Month.	Nova Scotia.	New Brunswick.	Saskatchewan.	Alberta.	British Columbia.	Canada.
January.....	509,273	23,846	38,049	615,942	242,767	1,429,877
February.....	438,735	21,997	40,905	467,562	216,657	1,185,856
March.....	444,571	25,231	17,130	424,288	227,472	1,138,692
April.....	465,889	22,450	15,831	384,909	223,360	1,112,439
May.....	476,303	23,467	21,713	417,795	227,361	1,166,639
June.....	487,148	23,626	23,366	500,601	230,150	1,264,891
July.....	491,969	18,729	29,119	549,029	227,466	1,316,312
August.....	518,792	28,455	24,159	556,348	231,268	1,359,022
September.....	497,150	24,128	25,468	534,242	147,689	1,228,677
October.....						
November.....						
December.....						

Statistics of the annual production of coal from 1881 to date are given in the following table:—

The total production of coal in Canada from 1785 to 1917, has been 268,499,334 tons: of this amount Nova Scotia is credited with 166,000,110 tons, or 61.8 per cent of the total; British Columbia 57,896,219 tons, or 21.6 per cent; Alberta 40,135,141 tons, or 15 per cent; Saskatchewan 3,179,571 tons, or 1.2 per cent; New Brunswick 1,156,128 tons, or 0.4 per cent, and the Yukon Territory 132,165 tons, or 0.05 per cent.

Annual Production of Coal.

Year.	Short tons.	Value.	Average per ton.	Year.	Short tons.	Value.	Average per ton.
1785-1880.....	16,426,253	\$ 28,190,518	\$ 1 72	1900.....	5,777,319	\$ 13,742,178	\$ 2 38
1881.....	1,537,106	2,688,621	1 75	1901.....	6,486,325	12,699,243	1 96
1882.....	1,848,148	3,248,446	1 76	1902.....	7,466,681	15,210,877	2 04
1883.....	1,818,684	3,109,635	1 71	1903.....	7,960,364	15,942,833	2 00
1884.....	1,984,959	3,593,831	1 81	1904.....	8,254,595	16,592,231	2 01
1885.....	1,920,977	3,417,807	1 78	1905.....	8,667,948	17,520,263	2 02
1886.....	2,116,653	3,739,840	1 77	1906.....	9,762,601	19,732,019	2 02
1887.....	2,429,330	4,398,206	1 81	1907.....	10,511,426	24,381,842	2 32
1888.....	2,602,552	4,674,140	1 80	1908.....	10,886,311	25,194,573	2 31
1889.....	2,658,303	4,894,287	1 84	1909.....	10,501,475	24,781,236	2 36
1890.....	3,084,682	5,676,247	1 84	1910.....	12,909,152	30,909,779	2 39
1891.....	3,577,749	7,019,425	1 96	1911.....	11,323,388	26,467,646	2 34
1892.....	3,287,745	6,363,757	1 94	1912.....	14,512,829	36,019,044	2 48
1893.....	3,783,499	7,359,080	1 95	1913.....	15,012,178	37,334,940	2 49
1894.....	3,847,070	7,429,468	1 93	1914.....	13,637,529	33,471,801	2 45
1895.....	3,478,344	6,739,153	1 94	1915.....	13,267,023	32,111,182	2 42
1896.....	3,745,716	7,226,462	1 93	1916.....	14,483,395	38,817,481	2 68
1897.....	3,786,107	7,303,597	1 93	1917.....	14,046,759	43,199,831	3 08
1898.....	4,173,108	8,224,288	1 97				
1899.....	4,925,051	10,283,497	2 09	Grand total..	268,499,334	599,699,304	2 23

Exports of Canadian Coal.

Statistics of the exports of coal according to the records of the Department of Customs are given in the following tables. The exports of Canadian coal in 1917 were 1,733,156 tons valued at \$7,387,192, or an average of \$4.26 per ton, as compared with exports in 1916 of 2,135,359 tons, valued at \$7,099,387, or an average of \$3.32 per ton. Besides Canadian coal exported there is also a small export of coal not the produce of Canada.

Annual Export of Coal.

(IN SHORT TONS.)

Calendar year.	Produce of Canada.	Not the produce of Canada.	Calendar year.	Produce of Canada.	Not the produce of Canada.
1908	1,729,833	102,071	1913	1,562,020	66,566
1909	1,588,099	161,098	1914	1,423,126	83,137
1910	2,377,049	159,859	1915	1,766,543	59,690
1911	1,500,639	133,943	1916	2,135,359	62,783
1912	2,127,133	46,706	1917	1,733,156	47,328

Imports of Coal.

The total imports of coal of all classes in 1917 "entered for consumption" as per the published reports of the Department of Customs, were 20,857,460 tons valued at \$70,562,357, as compared with the total imports in 1916 of 17,580,603 tons valued at \$38,289,666.

Imports of coal into Canada are subdivided into three classes as follows: Anthracite, including anthracite dust; bituminous, round and run-of-mine; and bituminous slack such as will pass through a $\frac{3}{4}$ -inch screen.

The imports of anthracite in 1917 were 5,320,198 tons valued at \$28,109,586 or an average of \$5.28 per ton, exceeding by 749,383 tons, or 16.4 per cent the imports in 1916, which were 4,570,815 tons valued at \$22,216,363 or an average of \$4.86 per ton. The imports of bituminous coal of all classes were 15,537,262 tons valued at \$42,452,771, as against imports of 13,009,788 tons valued at \$16,073,303 in 1916. The increase in bituminous imports of 1917 over those of 1916, was thus 2,527,474 tons, or over 19 per cent.

The bituminous imports in 1917 included: bituminous, round, and run-of-mine, 12,407,486 tons valued at \$33,712,894, or an average of \$2.72 per ton, and bituminous slack, 3,129,776 tons, valued at \$8,739,877, or an average of \$2.79 per ton. The value per ton of the imports during 1916 of bituminous, round, and run-of-mine coal averaged \$1.30 per ton and of bituminous slack \$1.06 per ton. There was, therefore, not only a very large increase in the imports of coal but the average price was more than double that of the previous year.

The record of the exports of bituminous coal to Canada as published in the Reports of Trade and Navigation at Washington differs in some years considerably from the Canadian record, in partial explanation of which it should be noted that the Canadian record represents coal "entered for home consumption". This entry may be deferred several months from the actual time of import, thus causing a difference in the monthly and yearly record. Furthermore, it is understood that the United States record includes a certain amount of coal used for bunkering lake steamers which would not be included as an import into Canada. The United States record shows exports of bituminous coal to Canada during the twelve months ending December, 1917, of 18,206,727 short tons, as against 13,260,181 tons in 1916; 9,356,889 tons in 1915; 10,271,409 tons in 1914, and 15,115,733 tons in 1913.

Annual Imports of Coal.

Calendar Year.	Bituminous round and run of the mine (a).		Anthracite coal and anthracite dust (b).		Bituminous slack such as will pass through $\frac{3}{4}$ screen (c).	
	Short tons.	Value.	Short tons.	Value.	Short tons.	Value.
		\$		\$		\$
1907.....	6,370,152	13,232,445	3,141,873	14,506,129	1,139,256	1,121,949
1908.....	6,025,574	12,516,748	3,160,110	14,478,536	1,111,811	1,355,677
1909.....	5,625,053	11,455,818	3,017,844	13,906,152	1,230,017	1,469,889
1910.....	5,966,466	11,919,341	3,266,235	14,735,062	1,365,281	1,795,598
1911.....	8,905,815	18,407,603	4,020,577	18,794,192	1,632,500	2,090,796
1912.....	8,491,840	16,846,727	4,184,017	20,080,388	1,919,953	2,550,922
1913.....	10,743,473	21,756,658	4,642,057	22,034,839	2,816,423	4,157,622
1914.....	7,776,415	14,954,321	4,435,010	21,241,924	2,509,632	3,605,253
1915.....	6,106,794	7,564,369	4,072,192	18,753,980	2,286,916	2,027,256
1916.....	9,504,552	12,368,679	4,570,815	22,216,363	3,505,236	3,704,624
1917.....	12,407,486	33,712,894	5,320,198	28,109,586	3,129,776	8,739,877

(a) Duty, 53 cents per ton. (b) Coal, anthracite and anthracite coal dust; duty free. (c) Duty 14 cents per ton.

In view of the attention being given at the present time to the importance of imports of coal to Canada, additional tables have been introduced as follows: Showing the monthly imports of bituminous and anthracite coal since 1913, such figures as are available for the first few months of 1918 being added to the record.

The United States record of monthly exports to Canada are also included for comparison.

Monthly Imports of Bituminous Coal into Canada.*

(IN SHORT TONS.)

—	1913.	1914.	1915.	1916.	1917.	1918.
January.....	827,428	917,558	547,772	1,124,918	1,031,719	1,134,493
February.....	861,813	851,591	653,016	942,811	760,545	1,460,391
March.....	1,026,503	1,140,943	547,756	918,206	1,114,958	1,175,076
April.....	682,286	713,764	417,133	727,467	1,331,449	986,052
May.....	1,108,935	611,918	481,908	894,505	893,055	1,541,537
June.....	1,298,167	634,383	661,569	1,239,882	1,260,652	1,442,412
July.....	1,192,914	639,417	752,229	1,096,718	1,581,361	1,670,806
August.....	1,358,495	850,340	846,162	1,188,822	1,890,923	1,670,397
September.....	1,795,093	1,082,544	680,151	1,287,554	1,567,773	1,604,802
October.....	1,178,649	1,166,197	900,450	1,314,286	1,582,797	
November.....	1,031,846	947,509	967,791	1,156,239	1,273,498	
December.....	1,197,767	729,883	937,773	1,118,380	1,248,532	
Total.....	13,559,896	10,286,047	8,393,710	13,009,788	15,537,262	

*Compiled from the Monthly Reports on Trade and Navigation, Department of Customs, Ottawa.

Monthly Imports of Anthracite Coal into Canada.*

(IN SHORT TONS.)

—	1913.	1914.	1915.	1916.	1917.	1918.
January.....	367,464	223,102	270,396	295,578	300,836	279,688
February.....	311,288	237,109	213,797	340,347	277,179	246,960
March.....	295,215	257,498	175,813	381,032	436,567	424,030
April.....	212,240	344,202	361,195	194,402	318,782	362,291
May.....	437,534	452,094	477,522	372,264	347,390	465,561
June.....	437,778	526,515	415,344	513,528	551,105	401,450
July.....	471,573	392,753	341,380	513,858	559,994	382,207
August.....	449,733	473,980	346,689	429,699	665,071	461,651
September.....	437,309	535,538	338,272	433,203	533,203	479,284
October.....	424,306	431,797	415,929	385,953	570,771	
November.....	420,998	306,566	370,334	383,103	413,200	
December.....	376,619	253,856	345,471	327,848	346,100	
Total.....	4,642,057	4,435,010	4,072,192	4,570,815	5,320,198	

*Compiled from the Monthly Reports on Trade and Navigation, Department of Customs, Ottawa.

Monthly Exports of Bituminous Coal from the United States to Canada.*

(IN SHORT TONS.)

—	1913.	1914.	1915.	1916.	1917.	1918.
January.....	633,020	631,510	396,715	600,616	654,350	510,022
February.....	622,933	493,597	438,905	605,684	646,008	647,855
March.....	824,935	694,810	306,203	611,640	884,498	951,196
April.....	892,781	443,102	426,970	740,865	1,022,171	1,263,030
May.....	1,647,061	790,229	660,253	1,467,229	1,569,297	1,978,799
June.....	1,588,286	889,119	978,028	1,476,453	2,017,989	2,019,816
July.....	1,716,094	1,126,562	1,138,383	1,457,326	1,555,972	2,098,600
August.....	1,765,659	1,694,668	1,060,717	1,708,697	2,715,628	2,194,099
September.....	1,827,309	1,347,282	1,058,176	1,519,550	1,739,580	2,038,673
October.....	1,543,887	1,097,164	1,224,880	1,196,122	2,392,809	
November.....	1,217,251	583,136	1,062,855	1,023,924	1,504,784	
December.....	836,517	480,230	704,804	852,076	1,503,640	
Total.....	15,115,733	10,271,409	9,356,889	13,260,181	18,206,727†	

* Compiled from the Monthly Summary of Foreign Commerce of the United States, Washington, D. C.

† Total taken from December Report.

Monthly Exports of Anthracite Coal from the United States to Canada.*

(IN SHORT TONS.)

	1913.	1914	1915.	1916.	1917.	1918 (a).
January.....	335,974	215,004	211,435	288,521	330,844	268,295
February.....	400,796	227,506	198,202	324,354	285,135	254,597
March.....	172,001	181,610	140,128	337,814	408,337	445,041
April.....	348,251	439,961	498,532	237,291	656,731	381,677
May.....	555,473	525,774	461,976	495,609	480,633	476,123
June.....	464,689	479,045	394,502	567,764	677,350	424,203
July.....	434,806	367,556	299,837	432,375	437,493	443,001
August.....	424,135	506,843	328,516	430,379	760,253	461,220
September.....	357,739	435,918	310,400	391,873	501,899	495,840
October.....	471,312	374,540	380,417	374,565	561,032	
November.....	562,404	261,919	312,583	349,053	329,259	
December.....	245,753	204,231	316,281	326,776	623,463	
Total.....	4,573,333	4,219,907	3,852,810	4,556,374†	6,048,570†	

* Compiled from the Monthly Summary of Foreign Commerce of the United States, Washington, D. C.

† Total taken from December Report.

(a) Total exports. Exports to Canada not separately stated, but will exceed 95 per cent of total exports.

Consumption of Coal.

The total consumption of coal in Canada estimated on the basis of production, imports and exports, was in 1917, 33,123,735 tons, which included 12,313,603 tons of Canadian coal and 20,810,132 tons of imported coal.

Statistics of the annual consumption are given in the following tables:—

Consumption of Coal, 1913-14-15-16-17.

(IN SHORT TONS.)

	1913.	1914.	1915.	1916.	1917.
Production.....	15,012,178	13,637,529	13,267,023	14,483,395	14,046,759
Exports of Canada.....	1,562,020	1,423,126	1,766,543	2,135,359	1,733,156
Home consumption of Canadian coal..	13,450,158	12,214,403	11,500,480	12,348,036	12,313,603
Imports.....	18,201,953	14,721,057	12,465,902	17,580,603	20,857,460
Exports not produce of Canada..	69,566	83,137	59,690	62,783	47,328
Canadian consumption of imported coal	18,132,387	14,637,920	12,406,212	17,517,820	20,810,132
Total consumption of coal in Canada..	31,582,545	26,852,323	23,906,692	29,865,856	33,123,735

Annual Consumption of Coal.

(IN SHORT TONS.)

Calendar Year.	Canadian.		Imported.		Total.	Per capita.
	Short tons.	%	Short tons.	%		
1886	1,595,950	45·9	1,884,161	54·1	3,480,111	0·758
1887	1,848,365	45·7	2,192,260	54·3	4,040,625	0·871
1888	2,013,925	37·8	3,314,353	62·2	5,328,278	1·137
1889	1,992,988	44·4	2,490,931	55·6	4,483,919	0·946
1890	2,360,196	47·8	2,581,187	52·2	4,941,383	1·051
1891	2,606,490	46·7	2,980,222	53·3	5,586,712	1·153
1892	2,464,012	44·4	3,082,429	55·6	5,546,441	1·133
1893	2,823,187	47·6	3,110,462	52·4	5,933,649	1·198
1894	2,743,376	48·5	2,917,818	51·5	5,661,194	1·130
1895	2,467,109	45·7	2,933,752	54·3	5,400,861	1·066
1896	2,639,055	45·1	3,206,456	54·9	5,845,511	1·140
1897	2,799,977	47·3	3,124,485	52·7	5,924,462	1·143
1898	3,023,079	48·0	3,274,981	52·0	6,298,060	1·200
1899	3,631,882	47·0	4,092,361	53·0	7,724,243	1·454
1900	3,989,542	47·8	4,361,563	52·2	8,351,105	1·561
1901	4,912,664	50·5	4,810,213	49·5	9,722,877	1·810
1902	5,376,413	51·0	5,165,938	49·0	10,542,351	1·927
1903	6,005,745	52·2	5,491,870	47·8	11,507,605	2·055
1904	6,697,183	49·2	6,909,651	50·8	13,606,834	2·346
1905	7,032,661	48·9	7,343,880	51·1	14,376,541	2·362
1906	7,927,560	51·7	7,398,906	48·3	15,326,466	2·425
1907	8,617,352	45·0	10,549,563	55·0	19,166,855	2·947
1908	9,156,478	47·3	10,195,424	52·7	19,351,902	2·820
1909	8,913,376	47·9	9,711,826	52·1	18,625,202	2·682
1910	10,532,103	50·2	10,438,123	49·8	20,970,226	2·960
1911	9,822,749	40·5	14,424,949	59·5	24,247,698	3·384
1912	12,385,696	46·0	14,549,164	54·0	26,934,860	3·596
1913	13,450,158	42·6	18,132,387	57·4	31,582,545	4·071
1914	12,214,403	45·5	14,637,920	54·5	26,852,323	3·325
1915	11,500,480	48·1	12,406,212	51·9	23,906,692	
1916	12,348,036	41·3	17,517,820	58·7	29,865,856	
1917	12,313,603	37·2	20,810,132	62·8	33,123,735	

In connexion with the records of consumption it may be of interest to record the very large percentage of Canadian coal consumption used by railway locomotives. During the twelve months ending June 30, 1917, the tonnage of coal used by locomotives amounted to no less than 9,788,424 tons.

The quantity of coal consumed by railway locomotives in recent years, as compiled from "Railway Statistics" published by the Department of Railways and Canals, is as follows:—

Annual Consumption of Coal by Railway Locomotives.

(IN SHORT TONS.)

Year ending June 30.	Anthracite.	Bituminous.	Total.
1911	6,444	6,769,903	6,776,347
1912	5,374	7,732,938	7,738,312
1913	4,662	9,040,963	9,045,625
1914	5,271	8,268,186	8,273,457
1915	3,691	6,673,848	6,677,536
1916	4,899	8,672,455	8,677,354
1917	4,900	9,783,524	9,788,424

Nova Scotia.

The production of coal in Nova Scotia in 1917 was 6,327,091 tons, as compared with a production in 1916 of 6,912,140 tons, showing a decrease of 585,049 tons, or 8.46 per cent.

The total sales of coal during 1917 were, 5,293,115 tons, of which 4,681,709 tons were sold for consumption in Canada; 353,142 tons for export to United States, 258,264 tons for export to Newfoundland and other countries.

The total quantity used by producers under colliery boilers, in coke ovens, and in steel plants, was 1,033,976 tons including 306,374 tons used in making coke and for other commercial purposes, and 727,602 tons used in the operation of the collieries, or by workmen.

A considerable tonnage of coal reported as sold for consumption in Canada is also used in the manufacture of coke, the total coal charged to coke ovens in the Province during the year being 1,046,279 tons.

The Dominion Coal Company has for many years been the principal operator, the total production of this firm's collieries at Cape Breton and at Springhill being 4,372,078 tons, or over 69 per cent of the Province's production and equivalent to over 31 per cent of the total Canadian production. The Nova Scotia Steel and Coal Company produced 644,321 tons, or 10.2 per cent of the total; the Acadia Coal Company 441,477 tons, or 6.9 per cent; the Inverness Railway and Coal Company, 227,753 tons, or 3.5 per cent; the Maritime Coal, Railway and Power Company, 228,353 tons; and the Intercolonial Coal Mining Company, 207,739 tons.

For a number of years Nova Scotia mines, chiefly those of Cape Breton, have been shipping from 2,000,000 to 2,500,000 tons of coal to Montreal and other Quebec markets, via the St. Lawrence. During the twelve months ending September, 1917, however, only 339,374 tons of Nova Scotia coal were marketed in Quebec province, as against 1,114,337 tons in 1916, and 2,048,222 tons in 1915.

Coal Production by Companies, in Nova Scotia, 1917.

(IN SHORT TONS.)

150

	Total Sales.	Used.		Production, ²	Stocks.		Losses ³	Output.
		For Coke. ¹	Colliery Consumption.		Jan. 1.	Dec. 31.		
Inverness Ry. and Coal Co.	183,556	.....	37,321	227,753	1,304	596	.....	227,045
Chimney Corner Mine (S. J. Doucet) ..	113	.....	.....	83	.....	.....	20	103
St. Rose Mine (G. V. Evans)	2,522	.....	50	163	.....	218	.....	381
Atlantic Coal Co.	9,023	.....	274	2,796	.....	.....	.....	2,796
Sterling Coal Co.	4,007	.....	146	9,169	.....	101	.....	9,270
Fenwick Coal Co., Ltd.	5,000	.....	302	4,364	.....	.....	.....	4,364
Sydney Coal Co., Ltd.	3,595,654	.....	300	5,300	.....	.....	.....	5,300
Dominion Coal Co., Ltd.	232,251	.....	320,874	3,974,413	35,667	26,951	12,525	3,978,292
Nova Scotia Steel and Coal Co., Ltd.	40,317	303,359	87,744	644,321	168	2,324	3,470	649,947
The Bras d'Or Coal Co., Ltd.	17,114	.....	6,078	47,256	75	.....	.....	47,181
Millford Mining Co. (Alex. Sutherland) ..	57,697	.....	1,276	18,390	.....	.....	.....	18,390
Greenwood Coal Co., Ltd.	392,214	.....	1,697	60,346	642	307	.....	60,011
Acadia Coal Co., Ltd.	165,483	.....	35,676	441,477	2,977	7,828	.....	446,328
Intercolonial Coal Mining Co.	198,045	3,015	25,483	200,739	899	1,423	.....	201,263
Maritime Coal, Ry. and Power Co.	7,551	.....	25,396	228,853	.....	.....	.....	228,253
Jones & McKinnon (Provincial)	333,190	.....	310	8,018	.....	.....	.....	8,018
Dominion Coal Co., Ltd. (Springhill) ..	26,523	.....	52,409	397,665	6,172	9,895	356	401,714
Minudis Coal Co., Ltd.	15,799	.....	4,775	32,331	.....	123	.....	32,454
Strathcona Coal Mine (A. W. Pugsley) ..	8,892	.....	403	16,551	.....	.....	.....	16,551
Fundy Mining Co.,	3,081	.....	57	4,074	.....	11	.....	4,085
Royal Coal Co., Ltd. ....	.....	.....	448	3,529	.....	.....	.....	3,529
Total	5,293,115	306,374	600,481	6,827,091	47,904	49,777	16,371	6,345,335

¹ Includes also coal used by producers for steel making and other purposes. losses are not furnished by all producers.

² Production is obtained by adding sales and coal used.

³ Complete records of

Coal Production by Companies, in Nova Scotia, 1916.
(IN SHORT TONS).

	Total sales.	Used.			Production [‡]	Stocks.		Losses [‡]	Output.*
		For coke. [‡]	Colliery consumption	Workmen.		Jan. 1.	Dec. 31.		
Inverness Ry. and Coal Co.	254,252	.....	36,801	7,249	298,302	3,495	1,304	.....	296,111
Sydney Coal Co., Ltd.	6,440	.....	146	134	6,720	.....	.....	.....	6,720
Dominion Coal Co., Ltd.	4,202,704	.....	324,028	58,757	4,588,489	58,092	35,667	19,965	4,583,029
Cape Breton Coal, Iron and Ry. Co.	1,088	.....	.....	.....	1,088	1,588	500	.....	.....
Nova Scotia Steel and Coal Co., Ltd.	338,825	282,508	21,465	21,204	664,192	643	240	.....	678,328
The Bras d'Or Coal Co., Ltd.	43,128	.....	5,744	746	49,618	150	75	.....	43,679
Alex. Sutherland (Milford Colliery)	8,555	.....	1,093	240	9,888	.....	.....	.....	9,888
Greenwood Coal Co., Ltd.	1,829	.....	23	118	1,970	.....	642	.....	2,612
Acadia Coal Co., Ltd.	387,182	.....	39,288	12,707	439,177	3,041	2,977	.....	439,113
Intercolonial Coal Mining Co.	127,630	3,284	26,240	5,757	162,911	2,813	900	.....	160,998
Maritime Coal, Ry. and Power Co.	203,368	.....	25,293	4,276	232,577	12,159	.....	.....	220,718
Jones & McKinnon	4,934	.....	246	123	5,303	.....	.....	.....	5,303
Dominion Coal Co., Ltd. (Springhill)	315,252	.....	63,476	11,920	390,648	3,669	6,172	321	363,472
Minudie Coal Co., Ltd.	50,122	.....	6,903	1,491	58,519	.....	.....	2,167	60,686
Strathcona Coal Co., Ltd.	2,566	.....	.....	.....	2,566	.....	.....	.....	2,566
Atlantic Grindstone, Coal and Ry. Co.	672	.....	200	.....	672	.....	.....	.....	672
Royal Coal Co., Ltd.	2,006	.....	.....	.....	2,200	100	.....	.....	2,100
	5,950,547	285,892	550,886	124,815	6,912,140	85,750	48,477	37,128	6,911,995

[‡]Includes also coal used by producers for steel making and other purposes. [‡]Production is obtained by adding sales and coal used. [‡]Complete records of losses are not furnished by all producers.

Output, Sales, Colliery Consumption, and Production of Coal in Nova Scotia.

Calendar Year.	Output.	Sold or used.	Colliery consumption	Production *	Price per ton of 2,240 lbs.	Value of production.
	Tons of 2,000 pounds.					
					\$ cts.	\$
1785 to 1873.....				8,053,670	1 75	12,583,860
1874.....	977,446	839,022	133,932	972,954	1 75	1,520,240
1875.....	874,945	791,610	139,003	930,613	1 75	1,454,084
1876.....	794,804	710,312	127,443	837,755	1 75	1,308,991
1877.....	848,396	769,513	110,702	880,215	1 75	1,375,339
1878.....	863,075	776,732	99,262	875,994	1 75	1,368,741
1879.....	882,863	771,259	94,961	866,220	1 75	1,353,469
1880.....	1,156,635	1,069,218	108,451	1,177,669	1 75	1,840,108
1881.....	1,259,183	1,159,216	120,834	1,280,050	1 75	2,000,079
1882.....	1,529,708	1,400,200	124,747	1,524,947	1 75	2,382,730
1883.....	1,503,259	1,453,226	125,383	1,578,609	1 75	2,466,576
1884.....	1,556,011	1,413,048	130,781	1,543,829	1 75	2,412,233
1885.....	1,514,470	1,405,051	142,939	1,547,990	1 75	2,418,735
1886.....	1,682,924	1,538,506	159,512	1,693,018	1 75	2,653,152
1887.....	1,871,330	1,702,046	156,550	1,858,596	1 75	2,904,057
1888.....	1,989,263	1,765,895	176,336	1,942,231	1 75	3,034,735
1889.....	1,967,032	1,741,720	177,107	1,918,827	1 75	2,998,167
1890.....	2,222,081	2,000,444	180,589	2,181,033	1 75	3,407,864
1891.....	2,290,158	2,071,938	195,981	2,267,919	1 75	3,543,624
1892.....	2,175,913	1,963,286	196,103	3,159,389	1 75	3,374,046
1893.....	2,489,807	2,214,848	230,076	2,444,924	1 75	3,820,194
1894.....	2,520,707	2,308,231	219,751	2,527,982	1 75	3,949,970
1895.....	2,239,727	2,008,270	216,875	2,225,145	1 75	3,476,790
1896.....	2,537,706	2,202,447	216,132	2,508,579	1 75	3,919,655
1897.....	2,020,835	2,290,032	203,522	2,493,554	1 75	3,896,179
1898.....	2,584,175	2,375,661	187,519	2,563,180	1 75	4,004,970
1899.....	3,209,296	2,950,067	198,755	3,148,822	2 00	5,622,898
1900.....	3,694,646	3,358,585	264,051	3,623,536	2 50	8,088,250
1901.....	4,279,557	3,820,462	337,606	4,158,068	1 75	6,496,982
1902.....	5,292,538	4,736,614	424,702	5,161,316	2 00	9,216,636
1903.....	5,841,429	5,113,607	539,731	5,653,338	2 00	10,095,246
1904.....	5,747,823	5,097,949	498,292	5,596,241	2 00	9,993,288
1905.....	5,821,622	5,167,476	479,107	5,646,583	2 00	10,083,184
1906.....	6,546,191	5,704,307	516,198	6,220,505	2 00	11,108,044
1907.....	6,468,563	5,864,406	489,727	6,354,133	2 25	12,764,999
1908.....	6,805,489	5,851,761	645,690	6,652,539	2 25	13,364,476
1909.....	5,718,871	5,066,912	585,177	5,652,089	2 25	11,354,643
1910.....	6,515,162	5,723,681	607,461	6,431,142	2 25	12,919,705
1911.....	7,125,551	6,358,080	646,340	7,004,420	2 25	14,071,379
1912.....	7,834,724	7,052,573	731,315	7,785,888	2 50	17,374,750
1913.....	8,125,104	7,237,006	723,067	7,980,073	2 50	17,812,663
1914.....	7,448,042	6,637,110	733,814	7,370,924	2 50	16,452,955
1915.....	7,513,739	6,818,773	644,597	7,463,370	2 50	16,659,308
1916.....	6,911,995	6,236,439	675,701	6,912,140	3 00	18,514,667
1917.....	6,345,335	5,599,489	727,602	6,327,091	3 44	19,410,737
Total.....				166,000,110		320,873,393

* This production is obtained by adding sales and colliery consumption.

Coal Trade by Counties in Nova Scotia, Calendar Years since 1906.

(IN SHORT TONS.)

153

Calendar Year.	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.	
	Raised.	Sold.*	Raised.	Sold.*	Raised.	Sold.*	Raised.	Sold.*	Raised.	Sold.*
1906.	659,734	566,308	769,496	657,310	4,804,407	4,221,293	312,554	259,396	6,546,191	5,704,307
1907.	534,047	445,288	840,533	729,043	4,698,147	4,346,180	385,886	343,895	6,468,563	5,864,406
1908.	662,157	550,648	849,802	678,025	4,840,653	4,267,346	452,877	375,742	6,805,489	5,851,761
1909.	494,919	403,371	748,860	599,743	4,081,333	3,723,135	398,759	340,663	5,718,871	5,066,912
1910.	350,363	288,706	714,846	588,678	5,035,800	4,571,347	374,950	374,950	6,515,162	5,823,681
1911.	538,296	436,125	833,956	691,852	5,405,355	4,917,902	347,944	312,201	7,125,551	6,358,080
1912.	716,914	595,138	765,678	641,890	6,039,296	5,530,765	312,886	284,780	7,834,724	7,052,573
1913.	675,544	553,845	817,177	694,659	6,313,275	5,709,995	329,108	298,507	8,135,104	7,257,006
1914.	702,496	572,765	681,356	571,063	5,767,566	5,266,733	296,624	226,549	7,448,042	6,637,110
1915.	736,794	620,667	581,296	508,145	5,920,670	5,486,292	275,049	203,669	7,513,739	6,818,773
1916.	685,517	578,914	612,611	528,480	5,317,756	4,874,793	296,111	254,252	6,911,995	6,236,439
1917.	711,164	603,633	725,992	635,523	4,680,650	4,176,581	227,529	183,752	6,345,335	5,599,489

* Sales include coal used for making coke and steel.

Number and Class of Workmen employed in the Coal Mines of Nova Scotia, Year ending September 30, 1917.

	Average days a month pit worked.	Average Daily Force.					Horses.
		Surface.	Under-ground.	Cutting coal.	Total colliery days.	Transportation, commercial upkeep repairs.	
Dominion Coal Co.	24.7	786	3,325	774	1,447,914	1,604	500
Nova Scotia Steel & Coal Co.	25.1	342	1,003	562	574,388	162	95
Brag d'Or Coal Co.	24.2	31	54	57	41,236	2	14
Sydney Coal Co.	25	4	4	9	5,100	1	18
Inverness Railway & Coal Co.	24.1	110	207	220	155,193	142	32
Acadia Coal Co.	24.5	240	356	428	301,056	77	51
Intercolonial Coal Co.	25.1	121	113	138	112,493	22	24
Greenwood Coal Co.	25	5	5	20	9,000	3	—
Milford Coal Co.	25	2	2	14	5,400	2	—
Cumberland Railway & Coal Co.	22.6	187	304	227	194,294	72	61
Joggins Mines	25	68	154	156	113,400	7	4
Minudie Coal Co.	23	30	24	36	24,840	20	4
Provincial Mining Co.	24	9	9	8	7,488	6	6
Atlantic Coal Co.	22	2	2	5	2,376	1	—
Eastern Coal Co.	22	5	3	8	2,110	1	—
Strathcona Coal Co.	23	4	7	24	9,660	8	4
Stirling Coal Co.	25	9	2	17	6,300	2	—
Fundy Mine.	19.4	3	3	3	1,571	2	1
Fenwick Coal Co.	23.7	9	16	10	2,488	8	—
Kimberly Coal Co.	22	15	14	15	8,712	—	1
St. George.	22	6	4	11	4,158	—	1
		1,988	5,611	2,742	3,029,177	2,142	798
					3,577,408		12,483

New Brunswick.

The production of coal in New Brunswick in 1917 was 189,095 tons, as against 143,540 tons in 1916, showing an increase of 45,555 tons or 31.7 per cent. This is the largest production of coal that has been recorded for this Province.

Through the courtesy of the operators the department is permitted to publish a record of the production from individual properties, as shown in the accompanying tables:—

Production of Coal in New Brunswick, 1917.

(IN SHORT TONS.)

—	Days in operation.	Total sales.	Total for colliery use.*	Total production.
Sheffield Coal Co., Ltd.	5 mos.	2,455	535	2,990
Harvey Welton, Minto.	260	17,558	.....	17,558
The Minto Coal Co., Ltd., Minto.	311	112,367	2,150	114,517
Rothwell Coal Co., Ltd., Rothwell.	282	11,818	655	12,473
J. Coakley, Minto.	208	2,314	.....	2,314
Grand Lake Coal Co., Ltd., Minto.	12 mos.	11,166	484	11,650
Northfield Coal Co., Ltd, Minto.	Contract.	6,539	.....	6,539
G. H. King, Chipman.	304	17,726	242	17,968
Dean Coal Co., Adamsville.	Contract.	1,963	232	2,195
All others (3). ....	.....	775	116	891
Total New Brunswick. ....	.....	184,681	4,414	189,095

* Includes consumption under boilers, etc., and coal used by workmen.

Production of Coal in New Brunswick, 1916.

(IN SHORT TONS.)

—	Days in operation.	Total sales.	*Total for colliery use.	Total production.
The Minto Coal Co., Ltd., Minto.	301	91,177	1,511	92,688
Rothwell Coal Co., Ltd., Rothwell.	294	5,529	672	6,201
J. Coakley, Minto.	100	808	.....	808
Grand Lake Coal Co., Ltd., Minto.	158	4,000	.....	4,000
Northfield Coal Co., Ltd., Minto. ....	.....	5,021	297	5,318
G. H. King, Chipman.	300	10,980	15	11,130
Dean Coal Co., Adamsville. ....	.....	2,892	204	3,096
All others (3). ....	.....	19,999	300	20,299
Total New Brunswick. ....	.....	140,406	3,134	143,540

*Includes consumption under boilers, etc., and coal used by workmen.

Annual Production of Coal in New Brunswick.

Calendar Year.	Short tons.	Value.	Average per ton.	Calendar Year.	Short tons.	Value.	Average per ton.
		\$	\$ cts.			\$	\$ cts.
1887.....	10,040	23,607	2 35	1904.....	9,112	18,224	2 00
1888.....	5,730	11,050	1 93	1905.....	29,400	58,800	2 00
1889.....	5,673	11,733	2 07	1906.....	34,076	68,152	2 00
1890.....	7,110	13,850	1 95	1907.....	34,584	77,814	2 25
1891.....	5,422	11,030	2 03	1908.....	60,000	135,000	2 25
1892.....	6,768	9,375	1 39	1909.....	49,029	98,496	2 25
1893.....	6,200	9,837	1 59	1910.....	55,455	110,910	2 00
1894.....	6,469	10,264	1 59	1911.....	55,781	111,562	2 00
1895.....	9,500	14,250	1 50	1912.....	44,780	89,560	2 00
1896.....	7,500	11,250	1 50	1913.....	70,311	166,637	2 37
1897.....	6,000	9,000	1 50	1914.....	98,049	241,075	2 46
1898.....	6,160	9,240	1 50	1915.....	127,391	309,612	2 43
1899.....	10,528	15,792	1 50	1916.....	143,540	386,016	2 69
1900.....	10,000	15,000	1 50	1917.....	189,095	708,010	3 74
1901.....	17,630	51,857	2 94				
1902.....	18,795	39,680	2 11				
1903.....	16,000	40,000	2 50				
				Total.....	1,156,128	2,886,683	

The coal producing areas include the Grand Lake coal-fields in Queens and Sunbury counties, and the Beersville area in Kent county. In the Grand Lake area the coal seams which vary in thickness from 20 to 32 inches are found at a depth of from 30 to 60 feet below the surface.

Saskatchewan.

The coal deposits of Saskatchewan furnish coal of the lignite variety only and the production in 1917 from 57 collieries was 355,445 tons valued at \$662,451, as compared with 281,300 tons valued at \$441,836 in 1916, an increase of 74,145 tons, or 26 per cent.

The 1917 production included 334,625 tons of coal sold and 20,820 tons used by producers for colliery consumption by workmen, or in brickmaking.

The output of coal comes chiefly from the vicinity of Estevan located on the Souris river, near the southeastern corner of the Province. Coal deposits exist for 75 or 100 miles in a northwest-southeast direction along the Souris river, on Big Muddy creek draining Willowbunch lake (only lately reached by a branch line of railway) and on the south branch of the Saskatchewan river, about 100 miles southwest of Saskatoon.

The annual production and the production by the principal operators in 1916 and 1917 is shown in the following tables:—

Production of Coal in Saskatchewan in 1917, by Principal Operators, over 1,000 tons each.

(IN SHORT TONS.)

Name of Company.	Days in operation.	Total sales.	*Total for colliery use.	Total production.
Auld, Jno. A., Roche Percee.....	81	1,242		1,242
Bienfait Mine, Bienfait.....	254	75,744	1,649	77,393
Blood, Adelbert, Fir Mountain.....	162	1,076		1,076
Caillet, David, Willowbunch.....	151	1,325		1,325
Campkin, Robt., Readlyn.....	210	1,020		1,020
Eidsness Bros., Gladmar.....	274	2,078		2,078
Estevan Coal & Brick Co., Ltd., Estevan.....	12 mos.	6,700	3,000	9,700
Heuvel, Hy. V., Hart.....	9 "	1,389		1,389
Manitoba & Sask. Coal Co., Ltd., Bienfait.....	238	71,457	4,802	76,259
McNeil & Rooks, Estevan.....	253	2,228		2,228
Nicholson, H., ".....	126	1,692	22	1,714
Parkinson, Geo., ".....		5,413		5,413
Sask. Coal, Brick & Power Co., Ltd., Shand.....	262	40,009	3,850	43,859
Western Dominion Collieries, Ltd., Taylorton.....	252	105,954	7,260	113,214
Wilson, Alex., Taylorton.....	138	3,717		3,717
All other operators (42).....		13,581	237	13,818
Total production Saskatchewan.....		334,625	20,820	355,445

*Includes consumption under boilers, etc., and coal used by workmen.

Production of Coal in Saskatchewan in 1916, by Principal Operators.

(IN SHORT TONS.)

Name of Company.	Days in operation.	Total sales.	Total for colliery use.*	Total production.
Western Dom. Collieries, Ltd., Taylorton.....	186	86,000	5,200	91,200
Manitoba & Saskatchewan Coal Co. Ltd., Bienfait...	197	67,057	4,771	71,828
The Bienfait Mine, Bienfait.....	211	55,132	2,174	57,306
Saskatchewan Coal, Brick & Power Co. Ltd., Shand.	210	25,156	1,400	26,556
Geo. Parkinson, Estevan.....	All year	7,241		7,241
Estevan Coal & Brick Co., Ltd., Estevan.....	51	2,500	2,000	4,500
McNeil & Rooks, Estevan.....	265	3,360		3,360
Eidsness Bros., Gladmar.....	281	3,237		3,237
Alex. Wilson, Taylorton.....	123	2,826	20	2,846
H. Nicholson, Estevan.....	130	1,859	45	1,904
A. G. Clark, Roche Percee.....	126	1,500	100	1,600
Jos. Bastien, Estevan.....	148	1,153		1,153
Henry V. Heuvel, Hart.....	110	1,030		1,030
All other operators (20).....		7,455	84	7,539
Total production, Saskatchewan.....		265,506	15,794	281,300

*Includes consumption under boilers, etc., and coal used by workmen.

Annual Production of Coal in Saskatchewan.

Calendar Year.	Short tons.	Value.	Average per ton.	Calendar Year.	Short tons.	Value.	Average per ton.
		\$	\$ cts.			\$	\$ cts.
1887	(a) 400	800	2 00	1905.....	107,596	152,334	1 42
1890	200	200	1 00	1906.....	108,398	164,146	1 51
1891				1907.....	151,232	252,437	1 67
1892	5,400	9,325	1 73	1908.....	150,556	253,790	1 69
1893	8,325	12,485	1 50	1909.....	192,125	296,339	1 54
1894	(b) 15,051	15,153	1 01	1910.....	181,156	293,923	1 62
1895	15,769	31,538	2 00	1911.....	206,779	347,248	1 68
1896	16,706	25,059	1 50	1912.....	225,342	368,135	1 63
1897	25,000	37,500	1 50	1913.....	212,897	358,192	1 68
1898	25,000	37,500	1 50	1914.....	232,299	374,245	1 61
1899	25,000	37,500	1 50	1915.....	240,197	365,246	1 52
1900	40,500	60,750	1 50	1916.....	281,300	441,836	1 57
1901	45,000	72,000	1 60	1917.....	355,445	662,451	1 86
1902	70,400	112,640	1 52				
1903	116,703	169,618	1 45	Total.....	3,179,571	5,139,411	.....
1904	124,885	187,021	1 50				

(a) From Turtle Mountain district, Manitoba.

(b) Including a small quantity from the Turtle Mountain district, Manitoba.

Alberta.

Lignite, bituminous and anthracite coals are all produced in Alberta.

In 1917 bituminous coal contributed 46.4 per cent of the total production, lignite 51.3 per cent, and anthracite 2.3 per cent.

The total production of coal in Alberta in 1917 was the highest recorded for the Province and amounted to 4,736,368 tons valued at \$14,153,685, or an average of \$2.99 per ton, compared with a production in 1916 of 4,559,054 tons valued at \$11,386,577, or an average of \$2.50 per ton.

There are many small operators in the Province, the number of names on the list being over 300. In 1917 there were 52 companies reporting a production in excess of 10,000 tons and the aggregate production by these firms was 96.1 per cent of the total for the Province. Thirteen of these companies reported a production exceeding 100,000 tons each, the largest operators being the West Canadian Collieries, Ltd., with 476,082 tons from Bellevue and Greenhill collieries; the Canadian Pacific Railway with a total of 433,728 tons from Bankhead and Lethbridge; and the North American Collieries, Ltd., with 384,807 tons from Lovettville, Coalhurst, Evansburg, Dodds, and Drumheller.

Of the total production 4,321,564 tons were reported as sales including 4,231,325 tons sold for consumption in Canada; 90,239 tons sold for export to United States; 414,804 tons were used by producers including 102,609 tons charged to coke ovens, and 312,195 tons used for colliery operation and by workmen.

The monthly production of anthracite, bituminous and lignite coals during 1917 and part of 1918 and the production of each of the larger collieries during 1917 and 1916 is shown in the following tables:—

Monthly Production of Coal in Alberta, 1917.

(IN SHORT TONS.)

Month.	Anthracite.	Bituminous.	Lignite.	Total.
January.....	12,906	194,321	285,731	492,958
February.....	10,158	197,617	240,889	448,664
March.....	12,202	265,674	175,299	453,175
April.....	10,504	118,926	80,854	210,284
May.....		40,996	59,203	100,199
June.....		17,469	85,774	103,243
July.....	9,126	180,633	167,555	357,314
August.....	11,314	258,010	221,436	490,760
September.....	9,954	231,771	216,167	457,892
October.....	10,448	240,496	292,249	543,193
November.....	11,597	266,862	319,624	592,083
December.....	10,016	192,530	284,057	486,603
	108,225	2,199,305	2,428,838	4,736,368

Monthly Production of Coal in Alberta, 1918.

(IN SHORT TONS.)

Month.	Anthracite.	Bituminous.	Lignite.	Total.
January.....	11,358	245,648	358,936	615,942
February.....	11,722	224,421	231,419	467,562
March.....	12,533	244,796	166,959	424,288
April.....	12,773	270,943	101,193	384,909
May.....	10,927	260,228	146,640	417,795
June.....	8,732	260,256	231,613	500,601
July.....	9,932	270,230	268,867	549,029
August.....	9,006	271,009	276,333	556,348
September.....	8,611	262,203	263,428	534,242
October.....				
November.....				
December.....				

Production and Output of Coal in Alberta, 1917, by Districts.

(IN SHORT T NS.)

	Operators reporting.	Total sales.	Total colliery consumption.*	Total production.	Per cent.	Output.
Banff..... Anthracite	1	30,804	77,421	108,225	2·29	118,765
Crowsnest..... Bituminous	5	1,066,316	122,140	1,188,456	25·09	1,188,934
Cannore..... "	1	181,103	15,844	196,947	4·16	196,947
Brazeau..... "	2	260,894	5,929	266,823	5·63	267,506
Jasper Park..... "	2	241,550	7,183	248,733	5·25	248,733
Yellowhead Pass..... "	4	152,405	6,777	159,182	3·36	161,620
Mountain Park..... "	1	132,895	6,269	139,164	2·94	139,164
Total.....	16	2,065,967	241,563	2,307,530	48·72	2,321,669
Pincher Creek..... Lignite	4	4,652	.....	4,652	0·10	5,078
Lethbridge..... "	11	543,199	70,818	614,017	12·96	622,658
Magrath..... "	3	936	.....	936	0·02	936
Milk River..... "	15	7,991	56	8,047	0·18	8,335
Taber..... "	12	131,847	25,526	157,373	3·32	171,117
Bow Island..... "	13	5,992	51	6,043	0·13	6,591
Medicine Hat..... "	5	13,889	86	13,975	0·30	14,976
Aldersyde..... "	8	7,076	.....	7,076	0·15	7,475
High River..... "	3	1,126	.....	1,126	0·02	1,102
Drumheller..... "	19	605,026	26,741	631,767	13·34	672,738
Big Valley..... "	2	26,005	748	26,753	0·56	26,753
Brooks..... "	8	9,233	.....	9,233	0·19	9,487
Hanna..... "	18	25,164	506	25,670	0·54	26,682
Lacombe..... "	19	16,047	50	16,097	0·34	17,347
Trochu..... "	10	14,531	492	15,023	0·32	16,451
Three Hills..... "	6	21,402	1,055	22,457	0·47	25,965
Carbon..... "	7	4,252	49	4,301	0·09	4,456
Battle River..... "	12	9,805	57	9,862	0·21	10,384
Camrose..... "	5	55,640	985	56,625	1·20	61,322
Tofield..... "	3	65,489	3,317	68,806	1·45	72,307
Clover Bar..... "	9	240,602	15,606	256,208	5·41	262,078
Edmonton..... "	7	113,117	7,663	121,080	2·56	121,080
Namoo..... "	4	17,776	419	18,195	0·38	20,504
Cardiff..... "	3	226,043	11,818	237,861	5·02	257,587
Wabamun..... "	1	13,484	50	13,534	0·29	19,690
Pembina..... "	1	74,763	7,148	81,9·1	1·73	88,613
Peace River..... "	3	210	.....	210	.....	215
Total Lignite.....	211	2,255,597	173,241	2,428,838	51·28	2,551,968
Grand Total.....	227	4,321,564	414,804	4,736,368	100·00	4,873,637

* Includes consumption under boilers, etc., and coal used by workmen.

Production of Coal in Alberta in 1917, by Principal Collieries. (IN SHORT TONS)

Name of Company, and Mine address.	Days in operation.	Total sales.	Total colliery consumption.*	Total production.
Alberta Block Coal Co., Ltd., Drumheller.....	143	59,594	1,912	61,506
Alberta Coal Mining Co., Ltd., (The) Cardiff.....	241	67,270	3,600	70,870
Atlas Coal Co., Ltd., Drumheller.....	148	15,515	1,781	17,296
Big Valley Collieries, Big Valley.....	303	25,414	748	26,162
Blain & Gilliland, Banner mine, Cardiff.....	287	54,753	2,716	57,469
Blue Diamond Coal Co., Ltd., Brule Mines.....	256	152,168	3,211	155,379
Brazeau Collieries, Ltd., Nordegg.....	229	248,900	5,585	254,485
Bush Mine Coal Co., Beverly.....	301	26,226	740	26,966
Cadomin Coal Co., Ltd., Coalspur.....	111	14,125	60	14,185
Canada West Coal Co., Ltd., Taber.....	224	90,225	20,260	110,485
Can. Pac. Ry., Bankhead.....	254	30,894	(a) 77,421	108,225
" Galt No. 3, Lethbridge.....	230	89,535	16,082	105,617
" Galt No. 6, Lethbridge.....	237	193,436	26,450	219,886
Cannmore Coal Co., Ltd., Cannmore.....	240	181,103	15,844	196,947
Cardiff Collieries, Ltd., Cardiff.....	154	104,020	5,502	109,522
Chinook Coal Co., Ltd., Commerce.....	250	64,870	11,333	76,203
City of Lethbridge Coal Mine, Lethbridge.....	269	12,204	.....	12,204
Clover Bar Coal Co., Ltd., Clover Bar.....	284	19,776	1,500	21,276
Dawson Coal Co., Ltd., (The) Edmonton.....	285	18,436	1,150	19,586
Dobell Coal Co., Ltd., (The) Tofield.....	298	30,798	1,910	32,708
Drumheller Land Co. (The) Drumheller.....	223	43,234	3,348	46,582
Ellis Coal Co., Ltd., Three Hills.....	296	19,419	989	20,408
Federal Coals, Limited, Lethbridge.....	266	14,359	32	14,421
Franco-Canadian Collieries, Ltd., Frank.....	216	92,127	16,596	108,723
Great West Coal Co., Ltd. (The) Clover Bar.....	266	71,670	4,017	75,687
Hillcrest Collieries, Ltd., Hillcrest.....	219	192,613	10,598	203,211
Humberstone Coal Co., Beverly.....	279	93,882	9,125	103,007
International Coal and Coke Co., Ltd., Coleman.....	241	116,548	(b) 70,639	187,187
Jasper Park Collieries—Jasper Mine.....	234	64,681	3,906	68,587
" " Miette Mine.....	199	24,701	66	24,767
Lakeside Coals Limited, Wabamun.....	.....	13,484	50	13,534
McGillivray Creek Coal and Coke Co., Ltd., Coleman.....	233	205,278	7,975	213,253
McPeak Coal Co., Ltd., Edmonton.....	267	18,375	1,360	19,735
Midland Collieries, Ltd., Midlandvale.....	190	60,090	2,747	62,837
Mountain Park Coal Co., Ltd., Mountain Park.....	279	132,895	6,269	139,164
Newcastle Coal Co., Ltd., Drumheller.....	117	28,377	852	29,229
North American Collieries, Ltd.:—				
Pacific Pass Colliery, Lovettville.....	284	66,903	6,142	73,045
Pembina Colliery, Evansburgh.....	246	74,763	7,148	81,911
Regal Colliery, Dadds.....	275	14,766	32	14,798
Monarch Colliery, Drumheller.....	12 months.	31,803	2,651	34,454
Lethbridge Colliery, Coalhurst (Kipp).....	219	164,348	16,251	180,599
Oliphant Munson Collieries, Ltd., Oliphant Mines.....	294	41,247	575	41,822
Ottewell Coal Co., Clover Bar.....	251	10,600	100	10,700
Premier Coal Co., Ltd., Drumheller.....	143	26,898	312	27,210
Regal Collieries, Limited, Taber.....	242	9,002	1,632	10,634
Rock Springs Coal and Brick Co., Ltd., Elcan.....	269	27,133	2,746	29,879
Rosedale Coal and Clay Products Co., Ltd., Rosedale..	289	87,100	36	87,136
Rose Deer Coal Mining Co., Ltd., Wayne.....	241	75,548	3,790	79,338
Round Hill Collieries, Ltd., Roundhill.....	206	19,314	400	19,714
Spicer Coal Co., Ltd., (The) Dinan.....	282	16,397	553	16,950
Saunders Creek Domestic and Steam Coal Co.....	12 months.	11,994	344	12,338
Star Coal Mines, Ltd., Aerial.....	235	63,131	1,221	64,353
Sterling Coal Co., Ltd., Drumheller.....	175	18,703	2,920	21,623
Sturgeon Consolidated Collieries, Ltd., Namao.....	295	14,821	414	15,235
Tofield Coal Co., Ltd., Tofield.....	241	32,990	1,087	34,077
Twin City Coal Co., Ltd., Edmonton South.....	296	71,442	4,976	76,418
West Canadian Collieries, Bellevue.....	205	263,223	11,412	274,635
" " Greenhill.....	217	196,527	4,920	201,447
Western Commercial Co., Ltd., Wayne.....	223	81,765	3,850	85,615
Yellowhead Coal Co., Ltd., Coalspur.....	227	30,130	.....	30,130
All other operators.....	.....	4,141,483	409,887	4,551,370
	.....	180,081	4,917	184,998
Total Alberta.....	.....	4,321,564	414,804	4,736,368

* Includes consumption under boilers, etc., and coal used by workmen.

(a) Includes 50,704 tons of coal used in the manufacture of briquettes. Total quantity coal and briquettes sold, or used in colliery operation 151,528 tons.

(b) Including for manufacture of coke, 51,905.

Production of Coal in Alberta in 1916, by Principal Collieries.

(IN SHORT TONS.)

Name of Company and Mine address.	Days in operation.	Total sales.	Total colliery consumption.*	Total production.
Alberta Block Coal Co., Ltd., Drumheller.....	155	39,990	1,095	41,085
The Alberta Coal Mg. Co., Ltd., Cardiff	164	40,744	4,000	44,744
Big Valley Collieries, Big Valley.....	175	11,504	250	11,754
Blain & Gilliland, Banner Mine, Cardiff.....	254	30,000	3,400	33,400
Blue Diamond Coal Co., Ltd., Brule Mines.....	293	56,938	328	57,266
Brazean Collieries, Ltd., Nordegg.....	248	274,605	7,125	281,730
Bush Mine Coal Co., Beverly.....	285	29,162	470	29,632
Canada West Coal Co., Ltd., Taber.....	194	81,532	16,562	98,094
Can. Pac. Ry., Bankhead.....	150	(a) 152,601	(b) 27,667	180,268
Can. Pac. Ry., Galt No. 3, Lethbridge.....	241	122,004	17,362	139,366
Can. Pac. Ry., Galt No. 6, Lethbridge.....	242	236,443	32,810	269,253
Canmore Coal Co., Ltd., Canmore.....	295	219,004	19,197	238,201
Cardiff Collieries, Ltd., Cardiff.....	222	124,065	7,791	131,856
Chinook Coal Co., Ltd., Commerce.....	253	68,039	12,611	80,650
Clover Bar Coal Co., Ltd., Clover Bar.....	227	16,018	3,030	19,048
The Dawson Coal Co., Ltd., Edmonton.....	252	16,252	7,209	23,452
The Dobell Coal Co., Ltd., Tofield.....	287	22,007	1,872	23,879
The Drumheller Land Co., Ltd., Drumheller.....	214	31,358	2,655	34,013
Elis Coal Co., Ltd., Three Mills.....	288	10,727	1,045	11,772
Franco-Canadian Collieries, Ltd., Frank.....	261	176,265	16,004	192,269
Georgetown Collieries, Canmore.....	†(8½ mos.)	33,234	2,575	35,809
The Great West Coal Co., Ltd., Clover Bar.....	277	67,799	2,676	70,475
Hillcrest Collieries, Ltd., Hillcrest.....	267	240,603	10,964	251,567
Humberstone Coal Co., Beverly.....	306	42,928	4,422	47,350
International Coal & Coke Co., Ltd., Coleman.....	293	126,346	(c) 85,501	211,847
Jasper Park Collieries—Pocahontas.....	277	90,868	4,402	95,270
Miette.....				
McGillivray Ck. Coal and Coke Co., Ltd., Coleman.....	257	206,406	7,492	213,898
Midland Collieries, Ltd., Drumheller.....	260	50,545	3,050	53,595
Mountain Park Coal Co., Ltd., Mountain Park.....	303	134,863	4,673	139,536
Newcastle Coal Co., Ltd., Drumheller.....	188	34,350	1,017	35,367
North American Collieries, Ltd.				
Pacific Pass Coll., Lovettville.....	275	61,188	5,877	67,065
Pembina " Evansburgh.....	285	64,069	6,876	70,945
Lethbridge " Coalhurst (Kipp).....	264	205,317	19,381	224,698
St. Albert " St. Albert.....	**135	6,556	3,392	9,948
Ottewell Coal Co., Clover Bar.....	.....	12,000	75	12,075
Premier Coal Co., Ltd., Drumheller.....	203	30,230	400	30,650
Red Deer Valley Coal Co., Ltd., Drumheller.....	230	19,350	1,960	21,310
Rock Springs Coal & Brick Co., Ltd., Elcan.....	185	17,472	2,025	19,497
Rosedale Coal & Clay Products Co., Ltd., Rosedale..	221	14,750	466	15,216
Rose Deer Coal Mg. Co., Ltd., Wayne.....	269	40,000	2,550	42,550
Round Hill Collieries, Ltd., Roundhill.....	269	27,231	450	27,681
The Spicer Coal Co., Ltd., Dinant.....	295	12,668	600	13,268
Star Coal Mines, Ltd., Aerial.....	237	56,387	1,166	57,553
Sterling Coal Co., Ltd., Drumheller.....	244	13,163	2,120	15,283
Tofield Coal Co., Ltd., Tofield.....	207	35,937	1,484	37,421
Twin City Coal Co., Ltd., Edmonton S.....	245	59,203	3,357	62,560
West Can. Collieries, Bellevue.....	228	323,132	14,902	338,034
" " Greenhill.....	274	188,189	3,978	192,167
All other operators.....		3,974,062	380,305	4,354,367
		199,505	5,182	204,687
Total Alberta.....		4,173,567	385,487	4,559,054

* Includes consumption under boilers, etc., and coal used by workmen.

(a) Briquettes, 106,814; (b) Briquettes, 1,144; (c) For manufacture of coke, 67,106.

† Company now out of business.

** Now abandoned.

Annual Production of Coal in Alberta.

Calendar Year.	Short tons.	Value.	Average per ton.	Calendar Year.	Short tons.	Value.	Average per ton.
		\$	\$			\$	\$
1886.	43,220	81,112	1.88	1902.	402,819	960,601	2.38
1887.	74,152	157,577	2.13	1903.	495,893	1,117,541	2.25
1888.	115,124	183,354	1.59	1904.	661,732	1,404,524	2.12
1889.	97,364	179,640	1.85	1905.	931,917	1,993,915	2.14
1890.	128,753	198,298	1.54	1906.	1,246,360	2,614,762	2.10
1891.	174,131	437,243	2.51	1907.	1,591,579	3,836,286	2.41
1892.	178,970	460,605	2.57	1908.	1,685,661	4,127,311	2.45
1893.	230,070	586,260	2.55	1909.	1,994,741	4,838,109	2.43
1894.	184,940	473,827	2.56	1910.	2,894,469	7,065,736	2.44
1895.	169,885	382,526	2.25	1911.	1,511,036	3,979,264	2.63
1896.	209,162	581,832	2.78	1912.	3,240,577	8,113,525	2.50
1897.	242,163	630,408	2.60	1913.	4,014,755	10,418,941	2.59
1898.	315,088	787,720	2.50	1914.	3,683,015	9,350,392	2.54
1899.	309,600	774,000	2.50	1915.	3,360,818	8,283,079	2.46
1900.	311,450	778,625	2.50	1916.	4,559,054	11,886,577	2.50
1901.	340,275	850,687	2.50	1917.	4,736,368	14,153,685	2.99
Total				40,135,141	101,187,962		

British Columbia.

The production of coal in British Columbia in 1917 was 2,433,888 tons, as compared with 2,584,061 tons in 1916, a decrease of 150,173 tons, or 5.9 per cent.

Of the total production in 1917, 1,933,944 tons were reported as sales, including 1,046,020 tons sold for consumption in Canada; 845,128 tons sold for export to United States, and 42,796 tons sold for export to other countries; 499,944 tons were used by producers, including 278,590 tons for making coke and 221,354 tons for the operation of collieries and by workmen. The production and distribution of the collieries on Vancouver island, of the Crowsnest district, and of the interior of Nicola and Princeton, are shown separately in the following tables.

The three largest operators in the Province were: The Crows Nest Pass Coal Company, with a total production of 504,762 tons; the Canadian Collieries (Dunsmuir), Limited, with 690,111 tons, and the Western Fuel Company, with 714,533 tons. These three companies contributed 78.5 per cent of the Province's production.

Coal Production by Districts in British Columbia, 1917.

(IN SHORT TONS.)

Coal.	Vancouver Island.	Nicola and Princeton.	Crowsnest and East Kootenay.	Total.
Sold for consumption in Canada	824,437	139,142	82,441	1,046,020
Sold for export to United States	576,708	15,471	252,949	845,128
Sold for export to other countries	42,796			42,796
Total sales	1,443,941	154,613	335,390	1,933,944
Used for making coke	60,804		217,786	278,590
Used for colliery consumption, etc	148,456	13,118	64,780	221,354
Production	1,648,201	167,731	617,956	2,433,888
Per cent	67.7	6.9	25.4	

Coal Production by Districts in British Columbia, 1916.

(IN SHORT TONS.)

Coal.	Vancouver Island.	Nicola and Princeton.	Crowsnest and East Kootenay.	Total.
Sold for consumption in Canada.....	770,869	103,535	84,357	958,761
Sold for export to United States.....	498,672	6,366	433,387	938,425
Sold for export to other countries.....	6,906	.....	.....	6,906
Total sales	1,276,447	109,901	517,744	1,904,092
Used for making coke.....	55,436	400	394,230	450,066
Used for colliery consumption, etc.....	141,087	12,602	76,214	229,903
Production	1,472,970	122,903	988,188	2,584,061

Coal Production by Collieries in British Columbia, 1917.

(IN SHORT TONS.)

168

Colliery.	Sold			Used.		Production.	Lost in washing, etc.	Stocks.		Output.
	In Canada.	To United States.	To other countries.	Total.	Making coke.	Under colliery boilers, etc.		First of year.	Last of year.	
Harwood.....	11,448	33,225	.....	44,673	.....	709	.....	.....	6,201	51,533
1. No. 1 Mine.....	184,919	263,489	.....	448,408	.....	59,302	.....	5,237	1,157	563,630
Reserve.....	73,509	71,832	.....	145,341	.....	16,100	.....	3,228	1,611	159,894
2. East Wellington No. 1.....	55,083	201	.....	55,284	.....	9,305	.....	3,312	.....	66,821
3. Wellington Extension Mine, Ladysmith	153,002	61,097	12,552	226,651	1,120	21,103	5,544	1,484	997	324,118
Comox Mines, Cumberland.....	251,022	86,988	30,244	368,254	59,684	13,299	75,731	3,975	2,750	568,912
4. South Wellington Mines.....	77,601	48,959	.....	126,560	.....	22,793	128,900	1,151	1,089	168,613
5. Grant.....	17,853	10,917	.....	28,770	.....	845	19,372	.....	.....	29,615
6. Michel.....	10,690	24,406	.....	35,096	89,718	17,601	.....	.....	.....	142,415
Coal Creek.....	33,214	161,797	.....	195,011	128,068	39,268	.....	35	30	362,388
7. Corbin.....	38,537	66,746	.....	105,283	.....	7,911	.....	.....	71	113,194
8. Middlesboro.....	88,372	.....	.....	88,372	.....	5,289	.....	.....	.....	93,474
9. Merritt.....	14,167	.....	.....	14,167	.....	793	.....	327	140	14,960
10. Inland.....	7,828	.....	.....	7,828	.....	701	448	.....	.....	8,794
11. Princeton.....	28,775	15,471	.....	44,246	.....	6,335	1,738	213	252	52,558
	1,046,020	845,128	42,796	1,933,944	278,590	221,354	231,733	20,160	15,373	2,660,834

1. Western Fuel Company.
2. British Columbia Coal Mining Co.
3. Canadian Collieries (Dunsuir), Ltd.
4. Pacific Coast Coal Mines, Ltd.

5. Nanose Collieries, Ltd.
6. Crow's Nest Pass Coal Co., Ltd.
7. Corbin Coal and Coke Co., Ltd.
8. Middlesboro Collieries, Ltd.

9. Merritt Collieries, Ltd. (formerly Diamond Vale).
10. Inland Coal and Coke Co., Ltd.
11. Princeton Coal and Land Co., Ltd.

Coal Production by Collieries in British Columbia, 1916.

(IN SHORT TONS.)

Colliery.	Sold.			Used.			Production.	Lost in washing, etc.	Stocks.		Output.
	In Canada.	To United States.	To other countries.	Total.	Making coke.	Under colliery boilers, etc.			First of year.	Last of year.	
1. No. 1 Mine.....	208,238	265,676	6,714	480,628	.....	50,120	530,748	.....	12,043	5,237	523,942
2. Reserve.....	25,241	45,211	1,192	70,644	.....	24,170	94,814	.....	820	3,228	97,222
3. East Wellington No. 1.....	74,985	1,048	.....	76,033	.....	8,804	84,837	5,531	3,023	512	87,857
4. Wellington Extension Mine, Ladysmith	147,467	68,489	.....	215,896	.....	20,805	236,701	60,256	10,429	1,259	287,787
5. Comox Mines, Cumberland.....	240,942	71,927	.....	312,869	55,436	11,106	379,411	126,836	7,325	3,975	502,897
6. South Wellington Mines.....	74,056	46,321	.....	120,377	.....	26,082	146,459	26,029	2,133	1,151	171,486
7. Michel.....	15,223	60,918	.....	76,141	176,216	21,073	273,430	.....	52	35	273,413
8. Coal Creek.....	62,992	306,593	.....	369,585	218,014	49,857	637,456	.....	59	30	637,427
9. Corbin.....	6,142	65,876	.....	72,018	.....	5,284	77,302	.....	.....	.....	77,302
10. Middlesboro.....	50,232	.....	.....	50,252	.....	5,229	55,481	.....	303	327	55,485
11. Inland.....	33,437	.....	.....	33,437	400	2,457	36,294	1,100	280	190	37,804
12. Princeton.....	19,768	6,366	.....	26,134	.....	4,676	30,810	2,201	34	16	32,993
13. Miscellaneous.....	98	.....	.....	98	.....	240	338	.....	.....	.....	338
	958,761	938,425	6,906	1,904,092	450,066	229,903	2,584,061	221,953	36,521	15,960	2,785,453

- | | | |
|--|------------------------------------|--------------------------------------|
| 1. Western Fuel Company. | 5. Crow's Nest Pass Coal Co., Ltd. | 8. Inland Coal and Coke Co., Ltd. |
| 2. Vancouver-Nanaimo Coal Mining Co. | 6. Corbin Coal and Coke Co., Ltd. | 9. Princeton Coal and Land Co., Ltd. |
| 3. Canadian Collieries (Dunsuir), Ltd. | 7. Middlesboro Collieries, Ltd. | 10. Pacific Coast Colliery of B.C. |
| 4. Pacific Coast Coal Mines, Ltd. | | |

Annual Production of Coal in British Columbia.

Calendar Year.	Output.	Home consumption.	Sold for export.	Production *.		Price per long ton.	Value.
				Long tons.	Short tons.		
						\$ cts.	\$
1836 to 1873	480,785	.....	.....	.....	538,480	4 00	1,923,140
1874	81,547	25,023	56,038	81,061	90,788	3 00	243,183
1875	110,145	31,252	66,392	97,644	109,361	3 00	292,932
1876	139,192	17,856	112,329	140,185	157,007	3 00	420,555
1877	154,052	24,311	115,381	139,692	156,455	3 00	419,076
1878	170,846	26,166	164,682	190,848	213,750	3 00	572,544
1879	241,301	40,294	192,096	232,390	260,277	3 00	697,170
1880	267,595	46,513	225,849	272,362	305,045	3 00	817,086
1881	228,357	40,191	189,323	229,514	257,056	3 00	688,542
1882	282,139	56,161	232,411	288,572	323,201	3 00	865,716
1883	213,299	64,786	149,567	214,353	240,075	3 00	643,059
1884	394,070	87,388	306,478	393,866	441,130	3 00	1,181,598
1885	365,596	93,227	237,797	333,024	372,987	3 00	999,072
1886	326,636	85,987	249,205	335,192	375,415	3 00	1,005,576
1887	413,360	99,216	334,839	434,055	486,142	3 00	1,302,165
1888	489,301	115,953	365,714	481,667	539,467	3 00	1,445,001
1889	579,830	124,574	443,675	568,249	636,439	3 00	1,704,747
1890	678,140	177,075	508,270	685,345	767,586	3 00	2,056,035
1891	1,029,097	202,697	806,479	1,009,176	1,130,277	3 00	3,027,528
1892	826,335	196,223	640,579	836,802	937,218	3 00	2,510,406
1893	978,294	207,851	768,917	976,768	1,093,980	3 00	2,930,304
1894	1,012,953	165,776	827,642	993,418	1,112,628	3 00	2,980,254
1895	939,654	188,349	756,334	944,683	1,058,045	3 00	2,834,049
1896	894,882	261,984	634,238	896,222	1,003,769	3 00	2,688,666
1897	802,296	290,310	619,860	910,170	1,019,390	3 00	2,730,510
1898	1,136,485	375,423	752,863	1,128,286	1,263,680	3 00	3,394,858
1899	1,306,324	526,058	751,711	1,277,769	1,431,101	3 00	3,833,307
1900	1,590,178	685,667	914,184	1,599,851	1,791,833	3 00	4,799,553
1901	1,691,557	799,666	914,163	1,713,829	1,919,488	3 00	5,141,487
1902	1,641,626	837,871	776,809	1,614,680	1,808,441	3 00	4,844,040
1903	1,450,663	947,499	549,449	1,496,948	1,676,581	3 00	4,490,844
1904	1,635,698	1,129,465	533,593	1,663,058	1,862,625	3 00	4,989,179
1905	1,736,696	1,089,667	647,343	1,737,010	1,945,452	3 00	5,211,030
1906	1,899,076	1,236,476	679,829	1,916,305	2,146,262	3 00	5,748,915
1907	2,219,602	1,438,402	673,114	2,111,516	2,364,898	3 50	7,390,306
1908	2,111,931	1,486,511	597,157	2,083,668	2,333,708	3 50	7,292,838
1909	2,388,196	1,585,232	741,667	2,325,899	2,606,127	3 50	8,144,147
1910	3,152,207	1,798,873	1,175,007	2,973,880	3,330,745	3 50	10,408,580
1911	2,304,794	1,657,422	612,696	2,270,118	2,542,532	3 50	7,945,413
1912	2,857,345	1,898,213	966,963	2,865,176	3,208,997	3 50	10,028,116
1913	2,587,357	1,799,643	623,946	2,423,589	2,714,420	3 50	8,482,562
1914	2,182,164	1,397,036	602,785	1,999,821	2,239,799	3 50	6,999,374
1915	1,962,817	1,191,219	653,078	1,844,297	2,065,613	3 50	6,455,041
1916	2,487,012	1,463,152	844,045	2,307,197	2,584,061	3 50	8,075,190
1917	2,375,745	1,380,325	792,789	2,173,114	2,433,888	3 79	8,235,716
Total				51,693,052	57,896,219		168,879,405

*This production is obtained by adding "Home Consumption" and "Sold for Export."

†52,935 tons of this amount were exported as sales without the division into "Home Consumption" and "Sold for Export."

Yukon.

Coal production in the Yukon in 1917 was reported as 4,872 tons, all the product of the Tantalus mine of the Five Fingers Coal Company, near Whitehorse.

The colliery of the Northern Light, Power and Coal Company, on Coal creek, has not been operated during the past two years, and the mining equipment is now reported as having been dismantled and removed.

Annual Production of Coal in Yukon Territory.

Calendar year.	Short tons	Value.	Average per ton.	Calendar year.	Short tons	Value.	Average per ton.
		\$	\$ cts.			\$	\$ cts.
1901.....	*5,864	86,230	14 70	1910.....	16,185	110,925	6 85
1902.....	4,910	37,280	7 59	1911.....	2,840	12,780	4 50
1903.....	1,849	29,584	16 00	1912.....	9,245	44,958	4 86
1904.....				1913.....	19,722	95,945	4 86
1905.....	7,000	21,000	3 00	1914.....	13,443	53,760	4 00
1906.....	7,000	28,000	4 00	1915.....	9,724	38,896	4 00
1907.....	15,000	60,000	4 00	1916.....	3,300	13,200	4 00
1908.....	3,847	21,158	5 50	1917.....	4,872	29,232	†6 00
1909.....	7,364	49,502	6 72	Total.....	132,165	732,450	

*Part of this production was mined in 1900.

†Value not reported, but estimated.

COKE.

The accompanying statistics cover only the production of coke in by-product and Beehive coke oven plants and do not include retort coke recovered by gas companies.

Both domestic and imported coal are used in the manufacture of coke in Canadian coke oven plants.

In 1917, 1,379,038 tons of domestic coal, and 549,885 tons of imported coal were charged to coke ovens, from which was obtained an output of 1,231,865 tons of coke, thus averaging 0.639 tons of coke per ton of coal charged. Coke from by-product ovens comprised 74 per cent of the total.

In 1916, 1,501,835 tons of domestic, and 633,076 tons of imported coal were charged to coke ovens, from which was obtained an output of 1,448,782 tons of coke, thus averaging 0.679 tons of coke per ton of coal charged. Coke from by-product ovens comprised 69 per cent of the total.

The amount of coke sold, or used by coke producers in 1917, was 1,245,862 tons, as compared with 1,469,741 tons in 1916, a decrease of 223,879 tons, or over 15 per cent.

In addition to the tonnage sold or used by producers, there were imported during 1917, 970,106 tons of coke, while the exports totalled 23,595 tons. The Canadian consumption in 1917 was, therefore, 2,192,373 tons, an increase of 14,055 tons over the estimated consumption in 1916. The consumption of oven coke during recent years has been as follows: 1,285,228 tons in 1908; 1,449,369 tons in 1909; 1,581,832 tons in 1910; 1,677,188 tons in 1911; 1,981,832 tons in 1912; 2,186,170 tons in 1913; 1,509,068 tons in 1914, and 1,772,461 tons in 1915.

Coke Production, 1917.

(In short tons.)

Province	Coal charged to ovens.	Coke output.	Stock on Hand.		Coke sold or used.	Per Cent of total production.	Value of coke sold or used.
			Jan. 1.	Dec. 31.			
Nova Scotia	1,046,279	645,069	1,114	1,597	643,757	51·67	\$ 3,218,785
Ontario.....	* 549,885	375,014	16,458	2,424	389,048	31·23	2,155,326
Alberta	51,905	31,196	959	506	31,649	2·54	181,982
British Columbia	280,854	180,586	4,122	3,300	181,408	14·56	1,106,488
Total... ..	1,928,923	1,231,865	22,653	7,827	1,245,862	100·00	\$ 6,662,581

* All imported coal.

Coke Production, 1916.

(In short tons.)

Province.	Coal charged to ovens.	Coke output.	Stock on Hand.		Coke sold or used.	Per cent of total production.	Value of coke sold or used.
			Jan. 1.	Dec. 31.			
Nova Scotia	985,063	653,836	1,711	1,114	654,433	44·53	\$ 2,617,732
Ontario.....	* 633,076	452,502	33,913	13,908	472,507	32·15	2,008,155
Alberta	67,106	42,548	361	959	41,950	2·85	167,800
British Columbia	449,666	299,896	2,949	1,994	300,851	20·47	1,255,725
Total.....	2,134,911	1,448,782	38,934	17,975	1,469,741	100·00	\$ 6,049,412

* All imported coal.

Distribution of Coke Production, 1917.

(In short tons.)

	Nova Scotia.	Ontario.	Alberta.	British Columbia.	Total.
Sold in Canada	1,723	.....	31,617	167,040	200,380
Sold for export . . . . .	.....	.....	32	14,237	14,269
Total sales	1,723	.....	31,649	181,277	214,649
Used by maker in blast furnace or other- wise	642,034	389,048	.....	131	1,031,213
Total sold or used.	643,757	389,048	31,649	181,408	1,245,862
Number of ovens in operation Dec. 31 . .	723	102	102	730	1,657
Number of ovens idle Dec. 31.	83	8	114	670	875

Annual Production of Coke.

Calendar Year.	Short Tons.	Value.	Average per Ton.	Calendar Year.	Short Tons.	Value.	Average per Ton.
1886.	35,396	\$ 101,940	\$ 2 88	1902.	502,043	\$ 1,519,185	\$ 3 03
1887.	40,428	135,951	3 36	1903.	561,318	1,734,404	3 09
1888.	45,373	134,181	2 96	1904.	554,083	2,032,048	3 66
1889.	54,539	155,043	2 84	1905.	700,488	2,436,211	3 48
1890.	56,450	166,298	2 95	1906.	782,055	2,863,503	3 66
1891.	57,084	175,592	3 08	1907.	842,003	3,583,468	4 26
1892.	56,135	160,249	2 85	1908.	858,257	3,449,361	4 02
1893.	61,078	161,790	2 65	1909.	862,011	3,484,393	4 04
1894.	58,044	148,551	2 56	1910.	902,715	3,462,872	3 84
1895.	53,356	143,047	2 68	1911.	935,651	3,630,410	3 88
1896.	49,619	110,257	2 22	1912.	1,411,229	5,164,331	3 66
1897.	60,686	176,457	2 91	1913.	1,530,499	5,919,596	3 87
1898.	87,600	286,000	3 26	1914.	1,023,860	3,658,514	3 55
1899.	100,820	350,022	3 47	1915.	1,170,473	4,258,580	3 64
1900.	157,134	649,140	4 13	1916.	1,469,741	6,049,412	4 12
1901.	365,531	1,223,225	3 36	1917.	1,245,862	6,662,581	5 35

Annual Production of Coke by Provinces.

Calendar Year.	Nova Scotia.		Ontario.		Alberta.		British Columbia.	
	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.
		\$		\$		\$		\$
1897	41,532	90,950					19,154	85,507
1898	48,400	111,000					39,200	175,000
1899	62,459	178,767					38,361	171,255
1900	61,767	223,395					95,367	425,745
1901	222,694	590,560					142,837	637,665
1902	363,330	899,930					138,713	619,255
1903	371,745	888,094					189,753	846,310
1904	275,927	808,022			20,984	78,936	257,172	1,148,090
1905	386,366	1,054,712			44,866	179,464	269,256	1,202,035
1906	476,364	1,540,976			69,486	268,042	236,205	1,054,485
1907	524,110	1,688,070			76,321	297,595	241,572	1,049,432
1908	505,929	1,658,151			75,645	309,019	276,683	1,482,191
1909	492,992	1,608,092			87,233	366,734	281,786	1,509,567
1910	508,058	1,655,775	24,685	148,110	121,578	486,312	248,394	1,172,675
1911	557,554	1,814,977	259,554	1,318,303	36,216	146,251	82,327	350,879
1912	625,918	1,840,129	379,854	1,709,343	105,684	424,027	299,773	1,190,832
1913	722,038	2,352,153	419,287	1,991,613	67,403	269,612	321,771	1,306,218
1914	343,289	1,118,614	386,314	1,352,099	28,059	116,236	265,198	1,071,565
1915	585,873	1,905,766	285,251	1,141,004	23,826	95,304	275,523	1,116,562
1916	654,433	2,617,732	472,507	2,008,155	41,950	167,800	300,851	1,255,750
1917	643,757	3,218,785	389,048	2,155,325	31,649	181,982	181,408	1,106,488

Annual Exports of Coke.

Calendar Year.	Short Tons.	Value.	Calendar Year.	Short Tons.	Value.
		\$			\$
1897	2,987	6,078	1908	58,708	248,759
1898	3,774	8,394	1909	74,067	329,051
1899	5,557	18,726	1910	57,971	250,715
1900	41,529	131,278	1911	9,852	39,323
1901	57,505	176,990	1912	57,744	252,763
1902	62,568	180,920	1913	68,235	308,410
1903	32,608	135,957	1914	67,838	305,117
1904	102,463	345,631	1915	35,869	160,053
1905	116,071	509,908	1916	48,539	221,334
1906	37,003	168,571	1917	23,595	137,318
1907	70,617	320,357			

Annual Imports of Oven Coke.

Calendar Year.	Short Tons.	Value.	Calendar Year.	Short Tons.	Value.
		\$			\$
1907	624,649	2,206,084	1913	723,906	2,180,830
1908	426,971	1,135,125	1914	553,046	1,585,259
1909	661,425	1,508,627	1915†	637,857	1,608,464
1910	737,088	1,908,725	1916	757,116	2,229,078
1911	751,389	1,843,248	1917	970,106	6,517,260
1912	628,174	1,702,856			

† Duty free.

The Nova Scotia coke was made at Sydney and Sydney Mines, the ovens formerly operated at Westville being idle throughout the year.

In Ontario the production came from the Algoma Steel Corporation plant at Sault Ste. Marie.

In Alberta the coke oven plants at Lille and Passburg were idle, while the plant at Coleman was operated throughout the greater part of the year.

In British Columbia coke was made by the Crows Nest Pass Coal Company at Fernie and Michel, and by the Canadian Collieries (Dunsmuir), Ltd., at Union Bay.

The coke production of the eastern provinces is used almost entirely in the iron and steel industry, while that of the western provinces is used chiefly by the copper and lead smelters, finding a market in the United States as well as in Canada.

Coke Oven By-products.

The coke oven plants of the Dominion Iron and Steel Company at Sydney, and the Algoma Steel Corporation at Sault Ste. Marie, are by-product plants, and the recoveries of coke oven by-products in 1917 included 8,277,078 gallons of tar; 9,941 tons of sulphate of ammonia, together with important quantities of benzol, toluol, and solvent naphtha and naphthalene.

Annual Production of Coke Oven By-Products.

Year.	Tar.	Sulphate of Ammonia.	Year.	Tar.	Sulphate of Ammonia.
	Gallons.	Short Tons.		Gallons.	Short Tons.
1901.....	2,662,612	1,614	1910.....	3,963,591	3,491
1902.....	4,094,185	2,393	1911.....	6,464,155	7,124
1903.....	3,281,249	3,207	1912.....	3,428,896	11,289
1904.....	1,649,197	1,773	1913.....	3,371,600	10,608
1905.....	3,407,784	2,500	1914.....	5,714,172	8,572
1906.....	3,725,723	2,364	1915.....	7,365,931	10,448
1907.....	4,424,615	1,738	1916.....	9,012,202	11,040
1908.....	4,450,166	3,342	1917.....	8,277,078	9,941
1909.....	4,016,824	3,416			

The imports of sulphate of ammonia in 1917 are reported as 566,969 pounds, valued at \$26,062 as against imports in 1916 of 293,096 pounds, valued at \$9,672, and imports in 1915 of 503,158 pounds, valued at \$14,637, and imports in 1914 of 763,597 pounds, valued at \$21,335.

Exports of sulphate of ammonia during the nine months ending December 31, 1917, were 8,047 tons, valued at \$693,377.

The export during the previous years has not been separately recorded.

FELDSPAR.

The shipments of feldspar in 1917 were 19,462 tons valued at \$89,826 or an average of \$4.62 per ton, as compared with shipments in 1916 of 19,488 tons valued at \$71,407, or an average of \$3.66 per ton.

The greater part of the feldspar shipped from Canadian mines is marketed with the pottery manufacturers in the United States. The production comes chiefly from the counties of Frontenac and Lanark in Ontario and the counties of Ottawa and Labelle in Quebec.

The exports of feldspar during the past four years have not been separately recorded.

Production of Feldspar.

Calendar Year.	Tons.	Value.	Average.	Calendar Year.	Tons.	Value.	Average.
		\$	\$ cts.			\$	\$ cts.
1890.....	700	3,500	5 00	1904.....	11,083	22,166	2 00
1891.....	685	3,425	5 00	1905.....	11,700	23,400	2 00
1892.....	175	525	3 00	1906.....	16,948	40,890	2 41
1893.....	575	4,525	7 87	1907.....	12,584	29,819	2 37
1894.....	Nil.	Nil.		1908.....	7,877	21,009	2 68
1895.....		*2,545		1909.....	12,783	40,383	3 16
1896.....	972	*2,583	2 66	1910.....	15,809	47,667	3 02
1897.....	1,400	3,290	2 35	1911.....	17,723	51,939	2 93
1898.....	2,500	6,250	2 50	1912.....	13,733	30,916	2 25
1899.....	3,000	6,000	2 00	1913.....	16,790	60,795	3 62
1900.....	318	1,112	3 50	1914.....	18,060	70,824	3 92
1901.....	5,350	10,700	2 00	1915.....	14,559	57,801	3 97
1902.....	7,576	15,152	2 00	1916.....	19,488	71,407	3 66
1903.....	13,928	18,966	1 36	1917.....	19,462	89,826	4 62

* Exports.

Exports of Feldspar.

Calendar Year.	Tons.	Value.	Average.	Calendar Year.	Tons.	Value.	Average.
		\$	\$ cts.			\$	\$ cts.
1908.....	9,524	34,045	3 57	1913.....	15,966	62,767	3 93
1909.....	10,854	35,234	3 25	1914.....	18,072	74,100	4 10
1910.....	15,691	47,962	3 07	1915.....	**		
1911.....	16,150	56,085	3 47	1916.....	**		
1912.....	12,779	44,114	3 45	1917.....	**		

** Not separately stated.

FLUORSPAR.

Fluorspar is another mineral the production of which has in Canada been stimulated by market demand and high prices.

The total shipments in 1917 were 4,249 tons valued at \$68,756 or an average of \$16.08 per ton as compared with shipments in 1916 of 1,284 tons valued at \$10,238, or an average of \$7.97 per ton, the entire production having been derived from the deposits near Madoc in Huntingdon and Madoc townships, Hastings county, Ontario.

The occurrence of these fluorspar deposits had long been known, but only spasmodic attempts at mining had been made. Previous shipments reported were: 1905, 12 tons; 1910, 2 tons valued at \$15; 1911, 34 tons valued at \$236; 1912, 40 tons valued at \$240. No shipments were made between 1913 and 1915 inclusive.

Most of the Canadian production has been sold for the use of steel furnace operators and metal smelters. The steel companies alone now use from 13,000 to 15,000 tons per annum. Considerable quantities have annually been imported for this purpose but there is no separate customs record thereof. Fluorspar is also used in manufacturing the electrolyte, hydrofluosilicic acid, used in the electrolytic refining of lead.

The Consolidated Mining and Smelting Company of Canada has installed at Trail a plant for the manufacture of this acid required in their metallurgical operations and has also now under development a fluorspar deposit in the Kettle River district of British Columbia from which it is expected all the company's requirements will be obtained.

Imports of Hydrofluosilicic Acid.

Calendar year.	Pounds.	Value.	Calendar year.	Pounds.	Value.
		\$			\$
1910.....	187,785	10,813	1914.....	1,384,087	41,576
1911.....	223,706	9,173	1915.....	1,117,874	36,085
1912.....	302,918	24,891	1916.....	896,426	28,611
1913.....	1,182,203	46,517	1917.....	320	97

GRAPHITE.

The total shipments of graphite in 1917 by Canadian producers, were 3,714 tons valued at \$402,892, or an average of \$100.48 per ton. In point of value this is the largest production that has been obtained from Canadian sources though the tonnage was slightly exceeded by the shipments in 1916.

Annual Production of Graphite.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		\$			\$			\$
1886.....	500	4,000	1897.....	436	16,240	1903.....	251½	5,565
1887.....	300	2,400	1898.....		13,698	1909.....	864	47,800
1888.....	150	1,200	1899.....	1,130	24,179	1910.....	1,392	74,087
1889.....	242	3,160	1900.....	1,922	31,040	1911.....	1,269	69,576
1890.....	175	5,200	1901.....	2,210	38,780	1912.....	2,060	117,122
1891.....	260	1,560	1902.....	1,095	28,300	1913.....	2,162	90,282
1892.....	167	3,763	1903.....	728	23,745	1914.....	1,647	107,203
1893.....	Nil.	Nil.	1904.....	452	11,766	1915.....	2,635	124,223
1894*.....	3	223	1905.....	541	16,735	1916.....	3,955	325,362
1895.....	220	6,150	1906.....	387	18,300	1917.....	3,714	402,892
1896.....	139	9,455	1907.....	579	16,000			

*Exports.

The 1917 production was obtained from two properties in Ontario and two in Quebec supplemented by a small shipment of high grade crucible plumbago taken out by the Hudson Bay Company from the vicinity of Lake Harbour on Baffin island.

By provinces the shipments were from Ontario 3,173 tons valued at \$296,587 and from Quebec (including the small shipment from Baffin island) 541 tons valued at \$106,305.

By grades the shipments included 540 tons of No. 1 flake valued at \$158,656 or an average of \$293.80 per ton; 650 tons of No. 2 flake valued at \$99,621, or an average of \$153.26 per ton; and 2,524 tons of amorphous and dust valued at \$144,615, or an average of \$57.30 per ton.

The total quantity of ore milled during the year was 19,614 tons from which was produced 4,003 tons of refined, or milled graphite. From three mills, operating on disseminated flake ores, the average recovery of refined graphite was 8.6 per cent of the rock milled. The Black Donald (Calabogie, Ont.) ore consists largely of amorphous graphite from which a large mill recovery is made.

The Canadian production is almost all exported. According to operators' returns 206 tons valued at \$30,195 were sold for domestic consumption during 1917 and 3,508 tons valued at \$372,697 sold for consumption in the United States.

The exports in 1917 according to customs records included 112 tons of crude ore and concentrates valued at \$7,455—an average of \$66.56 per ton together with manufactures of graphite (probably refined graphite) valued at \$384,505, or a total valuation of \$391,960.

Exports of Graphite.

Year.	CRUDE ORE AND CONCENTRATES.		MANU- FACTURES.	Total value.
	Tons.	Value.	Value.	
		\$	\$	\$
1908.....	385	10,158	876	11,034
1909.....	1,004	52,438	864	53,302
1910.....	788	53,008	66,658	119,666
1911.....	813	43,249	33,956	77,205
1912.....	1,654	70,763	58,920	129,683
1913.....	1,642	85,368	24,284	109,652
1914.....	919	50,528	72,718	123,246
1915.....	263	12,009	84,316	96,325
1916.....	311	13,114	304,919	318,033
1917.....	112	7,455	384,505	391,960

Imports of Raw and Manufactured Graphite.

Calendar Year.	Plumbago not ground.	Black lead.	Ground and manufactures.	Crucibles, clay or plumbago.	Total
1910.....	\$ 4,867	\$ 10,048	\$ 45,042	\$ 52,896	\$112,853
1911.....	4,940	14,172	37,020	56,814	112,946
1912.....	7,249	9,537	56,324	82,324	155,484
1913.....	9,375	8,633	64,254	73,971	156,233
1914.....	801	6,798	42,680	49,913	100,192
1915.....	3,436	6,084	35,597	106,761	151,878
1916.....	3,231	5,241	94,678	520,341	623,491
1917.....	47,218	*2,982	121,009	798,004	969,253

* Not published separately after first quarter.

Artificial Graphite.

Artificial graphite is manufactured in electric furnaces at Niagara Falls, Ontario, by the International Acheson Graphite Company. The annual production has been as follows:—

Annual Production of Artificial Graphite.

Calendar Year.	Pounds.	Calendar Year.	Pounds.	Calendar Year.	Pounds.
1906.....	445,047	1910.....	2,442,166	1914.....	1,234,239
1907.....	407,779	1911.....	2,172,098	1915.....	497,271
1908.....	428,540	1912.....	2,302,625	1916.....	525,048
1909.....	513,456	1913.....	2,184,472	1917.....	1,096,172

GYPSUM.

The production of gypsum which is used very largely in the construction of buildings, has fallen very considerably since 1913.

In 1917 the total quantity of gypsum mined was 365,659 tons, as compared with 424,431 tons in 1916, and 684,726 tons in 1913. The quantity of gypsum calcined in 1917 was 97,667 tons as compared with 94,414 tons in 1916 and 147,532 tons in 1913. The total shipments of gypsum in 1917 were 336,332 tons valued at \$881,984, or an average per ton of \$2.62, and included 223,760 tons of "lump" gypsum valued at \$246,774, or an average of \$1.10 per ton; 32,305 tons of "crushed" gypsum valued at \$51,869, or an average of \$1.61 per ton; 4,843 tons of "fine ground" valued at \$19,222, or an average of \$3.97 per ton; and 75,424 tons of "calcined" valued at \$564,119, or an average of \$7.48 per ton.

The total shipments in 1916 were: 342,915 tons, valued at \$738,593 and included 249,893 tons of "lump", valued at \$263,050, or an average of \$1.05 per ton; 15,680 tons of "crushed" valued at \$28,111, or an average value of \$1.79 per ton; 6,096 tons of "fine ground" valued at \$19,673, or an average of \$3.23 per ton, and 71,246 tons of "calcined", valued at \$427,759; or an average of \$6 per ton.

A report¹ on the gypsum industry in Canada, issued by the Mines Branch, describes in detail the operated deposits in the different provinces, and the method of treatment followed in preparing gypsum for the market.

The total quantity of gypsum mined and the total quantity calcined during the past ten years is shown in the following table:—

Gypsum Mined and Gypsum Calcined.

(Short Tons.)

Year.	Total gypsum mined.	Gypsum calcined.	Year.	Total gypsum mined.	Gypsum calcined.
1905.....	443,569	26,855	1912.....	549,856	133,392
1906.....	492,759	28,831	1913.....	684,726	147,532
1907.....	489,962	34,752	1914.....	579,841	138,212
1908.....	375,444	48,727	1915.....	505,989	84,763
1909.....	493,068	63,670	1916.....	424,431	94,414
1910.....	548,019	69,889	1917.....	365,659	97,667
1911.....	515,979	76,718			

Statistics of the shipments of crude and calcined gypsum since 1905 and of the annual production of gypsum products since 1886, are shown in the tables following:—

Shipments of Crude and Calcined Gypsum, 1916 and 1917.

Grade.	1916.			1917.		
	Tons.	Value.	Per ton.	Tons.	Value.	Per ton.
Lump.....	249,893	\$ 263,050	\$ cts. 1 05	223,760	\$ 246,774	\$ cts. 1 10
Crushed.....	15,680	28,111	1 79	32,305	51,869	1 61
Fine ground.....	6,096	19,673	3 23	4,843	19,222	3 97
Calcined.....	71,246	427,759	6 00	75,424	564,119	7 48
Total.....	342,915	738,593	2 15	336,332	881,984	2 62

¹ Gypsum in Canada: Its Occurrence, Exploitation and Technology. L. H. Cole, Mines Branch, Department of Mines, Ottawa, Canada, 1915, No. 245.

Shipments of Crude and Calcined Gypsum, 1905-1913.

Calendar year.	Crude (Lump).			Crude (Ground).			Calcined.		
	Tons.	Value.	Per ton.	Tons.	Value.	Per ton.	Tons.	Value.	Per ton.
		\$	\$ c.		\$	\$ c.		\$	\$ c.
1905.....	412,155	409,146	0 99	3,255	8,779	2 70	26,748	168,243	6 29
1906.....	442,132	473,960	1 07	3,195	9,823	3 07	23,695	159,511	6 73
1907.....	454,668	473,831	1 04	6,732	16,268	2 42	24,521	156,815	6 40
1908.....	298,188	307,532	1 03	9,504	25,468	2 68	33,272	242,701	7 29
1909.....	423,474	457,038	1 08	8,814	26,159	2 97	40,841	326,435	7 99
1910.....	469,573	508,686	1 08	6,121	17,390	2 84	49,552	408,370	8 24
1911.....	449,823	481,077	1 07	7,149	23,125	3 23	61,411	489,192	7 97
1912.....	453,577	525,345	1 16	15,487	29,244	1 89	109,394	770,031	7 04
1913.....	499,460	615,493	1 23	10,281	20,576	2 00	126,629	811,670	6 41

Annual Production of Gypsum.

Calendar Year.	Tons.	Value.	Per ton.	Calendar Year.	Tons.	Value.	Per ton.
		\$	\$ c.			\$	\$ c.
1886.....	162,000	178,742	1 10	1902.....	333,599	379,479	1 14
1887.....	154,008	157,277	1 02	1903.....	314,489	388,459	1 24
1888.....	175,887	179,393	1 01	1904.....	345,961	373,474	1 08
1889.....	213,273	205,108	0 96	1905.....	442,158	586,168	1 32
1890.....	226,509	194,033	0 86	1906.....	469,022	643,294	1 37
1891.....	203,605	206,251	1 01	1907.....	485,921	646,914	1 33
1892.....	241,048	241,127	1 00	1908.....	340,964	575,701	1 69
1893.....	192,568	196,150	1 02	1909.....	473,129	809,632	1 71
1894.....	223,631	202,031	0 90	1910.....	525,246	934,446	1 78
1895.....	226,178	202,608	0 89	1911.....	518,383	993,394	1 92
1896.....	207,032	178,061	0 86	1912.....	578,458	1,324,620	2 29
1897.....	239,691	244,531	1 02	1913.....	636,370	1,447,739	2 27
1898.....	219,256	232,515	1 06	1914.....	516,880	1,156,207	2 24
1899.....	244,566	257,329	1 05	1915.....	474,815	854,929	1 80
1900.....	252,101	259,009	1 02	1916.....	342,915	738,593	2 15
1901.....	293,799	340,148	1 16	1917.....	336,332	881,984	2 62

Annual Production of Gypsum by Provinces.

Calendar Year.	Nova Scotia.]		New Brunswick.		Ontario.		Manitoba.		British Columbia.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$		\$
1887.....	116,346	116,346	29,102	29,216	8,560	11,715				
1888.....	124,818	120,429	44,369	48,764	6,700	10,200				
1889.....	165,025	142,850	40,866	49,130	7,382	13,128				
1890.....	181,285	154,972	39,024	30,986	6,200	8,075				
1891.....	161,934	153,955	36,011	33,996	5,660	18,300				
1892.....	197,019	170,021	39,709	65,707	4,320	5,399				
1893.....	152,754	144,111	36,916	41,846	2,898	10,193				
1894.....	168,300	147,644	52,962	48,200	2,369	6,187				
1895.....	153,809	133,929	66,949	63,839	2,420	4,840				
1896.....	136,590	111,251	67,137	59,024	3,305	7,786				
1897.....	155,572	121,754	82,653	118,116	1,461	4,661				
1898.....	132,086	106,610	86,083	121,704	1,087	4,201				
1899.....	126,754	102,055	116,792	151,296	1,020	3,978				
1900.....	138,712	108,828	112,294	145,850	1,095	4,331				
1901.....	170,100	136,947	121,595	139,709	1,504	5,692	600	7,800		
1902.....	206,087	181,425	124,041	170,153	1,917	7,699	1,554	20,202		
1903.....	189,427	173,881	119,182	172,080	2,720	21,988	3,160	20,510		
1904.....	218,530	153,600	190,991	187,524	2,390	18,350	4,000	14,000		
1905.....	272,252	298,248	163,553	232,586	1,853	23,834	4,500	31,500		
1906.....	333,312	345,414	131,246	250,960	2,965	24,420	3,200	22,500		
1907.....	357,411	380,859	118,106	213,638	10,404	52,417				
1908.....	234,455	230,433	81,620	191,312	10,389	42,456	14,500	111,500		
1909.....	345,682	364,379	98,716	226,975	11,731	48,278	17,000	170,000		
1910.....	400,455	458,638	90,236	213,579	15,055	67,229	19,500	195,000		
1911.....	353,999	406,457	93,205	115,044	27,399	98,018	43,000	372,000	780	1,875
1912.....	376,082	481,493	82,757	185,821	53,119	176,056	66,500	481,250		
1913.....	404,801	479,515	103,954	279,395	62,315	208,029	65,100	479,500	200	1,300
1914.....	303,155	368,931	79,083	200,680	81,219	204,033	53,423	382,563		
1915.....	298,864	339,857	74,501	184,929	81,172	190,422	20,278	139,721		
1916.....	238,212	278,160	39,546	153,064	36,668	116,086	28,439	191,283		
1917.....	215,472	301,261	38,556	191,631	48,947	130,138	33,347	258,934	10	20

Exports and Imports.

Statistics of exports and imports of gypsum as compiled from the reports of Trade and Navigation are shown in the accompanying tables: the exports of crude gypsum during the calendar year 1917 were 224,423 tons valued at \$245,182, or an average of \$1.09 per ton, as compared with exports in 1916 of 221,156 tons valued at \$252,476, or an average value of \$1.14 per ton.

There were also exports of ground gypsum in 1917 valued at \$146,384 as compared with corresponding exports in 1916 valued at \$154,630. The total value of the exports of gypsum both crude and ground was in 1917, \$391,566 as compared with a value of \$407,106 in 1916.

The exports of ground gypsum included above probably include exports of calcined product, and possibly other gypsum products, the value is greatly in excess of the reported production of crushed and fine ground gypsum.

The total value of gypsum imports of all grades during the calendar year 1917 was \$35,460 and included crude gypsum 64 tons valued at \$999, or an average of \$15.61 per ton; ground gypsum 282 tons valued at \$5,355, or an average of \$18.99 per ton, and plaster of Paris 3,101 tons valued at \$29,106, or an average of \$9.39 per ton.

Exports of Crude Gypsum.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		\$			\$			\$
1906.....	404,464	462,814	1910.....	346,081	416,725	1914.....	345,830	404,234
1907.....	375,026	424,794	1911.....	362,102	425,161	1915.....	292,234	336,380
1908.....	280,091	324,574	1912.....	364,643	423,208	1916.....	221,156	252,476
1909.....	315,201	372,286	1913.....	417,302	504,383	1917.....	224,423	245,182

Exports of Ground Gypsum.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	\$		\$		\$
1906.....	2,934	1910.....	12,306	1914.....	35,490
1907.....	557	1911.....	4,429	1915.....	80,933
1908.....	9,765	1912.....	6,495	1916.....	154,630
1909.....	2,787	1913.....	5,795	1917.....	146,384

Imports of Gypsum.

Calendar Year.	Crude Gypsum.		Ground Gypsum.		Plaster of Paris.	
	Tons.	Value.	Lbs.	Value.	Lbs.	Value.
		\$		\$		\$
1910.....	12,271	21,073	13,380,600	13,242	38,090,300	135,483
1911.....	2,035	11,792	3,362,400	3,619	57,035,700	190,371
1912.....	3,503	16,254	14,144,000	19,651	64,991,600	232,198
1913.....	4,522	21,763		11,770	40,226,400	154,719
1914.....	3,572	16,448	1,072,600	4,301	15,477,500	54,282
1915.....	1,799	7,734	268,500	2,253	4,882,900	15,832
1916.....	3,022	14,358	564,700	3,404	7,571,700	25,529
1917.....	64	999	563,000	5,355	6,202,900	29,106

Crude gypsum, duty free. Ground gypsum, duty 15 per cent. Plaster of Paris, duty $12\frac{1}{2}$ cents per 100 pounds.

The Nova Scotia production and the larger part of the New Brunswick production as well, is almost all disposed of in the United States market. The large deposits and the excellent facilities for water transportation are responsible for the gypsum being shipped as quarried to grinding and calcining plants outside these provinces.

Returns from Nova Scotia operators show the tonnage of gypsum mined during recent years to have been as follows: 225,958 tons in 1917, 298,035 tons in 1916, 317,076 tons in 1915, 339,747 tons in 1914 and 423,977 tons in 1913. The quantity calcined in 1917 was 8,269 tons. The shipments of gypsum in 1917 included the following: "Lump," 206,246 tons, valued at \$221,935; "fine ground," 1,457 tons, valued at \$4,808; "calcined," 7,769 tons, valued at \$74,518. By far the greater portion of the production was obtained from quarries in Hants county, near Windsor, Walton and Cheverie, the balance being from quarries at Quarry St. Anns and Iona, in Victoria county.

In New Brunswick the quantity of gypsum mined in 1917 was 48,396 tons as compared with 53,003 tons in 1916; 78,640 tons in 1915, 86,912 tons in 1914, and 112,739 tons in 1913. The quantity calcined in 1917 was 30,555 tons. The shipments included 17,504 tons of lump; 2,369 tons of crushed and fine ground; and 18,683 tons of calcined.

In Ontario the quantity of gypsum mined in 1917 was 52,209 tons as compared with 39,393 tons in 1916; 85,444 tons in 1915, and 89,159 tons in 1914. The quantity calcined in 1917 was 21,897 tons. The total shipments included 29,509 tons of crushed; 1,060 tons of fine ground and 18,378 tons of calcined.

Manitoba's shipments of gypsum are almost entirely in the calcined form. The total quantity of crude gypsum mined in 1917 was 39,096 tons as compared with 34,000 tons in 1916, 24,859 tons in 1915, 64,023 tons in 1914, 76,500 tons in 1913, and 80,000 tons in 1912.

The quantity calcined in 1917 was 36,946 tons. The shipments included 2,753 tons of crushed gypsum and 30,594 tons of calcined.

MAGNESITE.

The production of magnesite during 1917 was confined to the deposits in Argenteuil county, Province of Quebec. The hydro-magnesite deposits at Atlin in northern British Columbia from which trial shipments were made in 1916 were not worked during the past year. The great demand for refractory furnace lining and the shortage of supply of magnesite which had formerly been obtained from Austria and Greece has actively stimulated the Canadian production. The total shipments in 1917 were 58,090 tons, valued at \$728,275, and included crude magnesite, calcined (burnt in lime-kilns), and dead burnt clinker (sintered in rotary kilns after mixture with about 5 per cent of iron ore, magnetite). The crude magnesite sold at about \$10 per ton, the calcined at \$28.50 and the clinkered, or dead burned material, at from \$40 to \$46 per ton. The shipments in 1916 of crude and calcined were 55,413 tons, valued at \$563,829, or an average of \$10.17 per ton, and in 1915, 14,779 tons, valued at \$126,584, or an average of \$8.56 per ton.

The exports and imports of magnesite have not been separately recorded. The imports of magnesia in 1916 were 115,000 pounds, valued at \$16,186, and the imports of magnesite brick during the nine months ending December 31, 1917, were valued at \$470,801, the quantity not being stated.

Annual Sales of Magnesite.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		\$			\$
1908.....	120	840	1913.....	515	3,335
1909.....	330	2,508	1914.....	358	2,240
1910.....	323	2,160	1915.....	14,779	126,584
1911.....	991	5,531	1916.....	55,413	563,829
1912.....	1,714	9,645	1917.....	58,090	728,275

Imports of Magnesia.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		\$			\$
1910.....	233	10,847	1914.....	127	16,429
1911.....	253	11,012	1915.....	91	9,695
1912.....	379	29,641	1916.....	195	20,651
1913.....	145	12,226	1917.....	58	16,186

The following review of the magnesite industry in Quebec has been compiled by Mr. Howells Fr  chette:—

CHARACTER OF MAGNESITE MINED IN QUEBEC.

“Quebec possesses the only known workable deposits of magnesite in Eastern Canada. These are situated in Argenteuil county, about midway between Ottawa and

Montreal, to the north of the Ottawa river. They occur in the Grenville series of the Archean formation. The magnesite is very similar in appearance to the crystalline limestone of this series, being coarsely crystalline and usually white, though sometimes bluish grey or yellowish. The magnesite rock forming the deposits is composed essentially of the mineral magnesite (magnesium carbonate). Dolomite (lime-magnesium carbonate) is the principal accessory mineral, being practically always present, sometimes constituting a large proportion of the rock. Serpentine, diopside and other minerals are frequently found disseminated, generally in small quantity, through sections of the deposits.

The following analyses will serve to illustrate the general composition of the magnesite rock:—

Insoluble mineral matter.....	2.20	3.08	2.00	2.00	0.74
Iron oxide.....	0.13	0.29	0.57	0.50	0.24
Alumina.....	0.03	0.35	1.47	0.80	0.36
Lime.....	8.80	10.06	5.80	6.95	10.05
Magnesia.....	39.12	37.76	41.34	40.76	38.52
Carbon dioxide.....	49.72**	49.39*	49.66*	49.88*	49.86*

** By difference.

* Calculated.

The insoluble siliceous matter, the iron and the alumina are usually low in percentage. The lime, even in selected samples, is seldom below 6 per cent.

According to Dr. M. E. Wilson,¹ these deposits are associated with the metamorphosed group of sediments, crystalline limestone, garnet gneiss, and quartzite, composing the Grenville series, and in three localities the magnesite is found in close proximity to outcrops of the pyroxenic rocks of the Buckingham series. It is probable that these deposits were formed by the replacement of the lime by magnesia in crystalline limestone, the transformation being first to dolomite and finally to magnesite.

Principal operators.—The principal operators are the North American Magnesite Company, Limited, and the Scottish-Canadian Magnesite Company, Limited; Messrs. Fitzsimons, Boshart and Inglee have also made some shipments.

The North American Magnesite Company owns and operates quarries on lot 15, range IX, and lot 18, range XI, Grenville township, and operates under lease, a quarry on the north end of lot 13, range I, Harrington township. From all these quarries crude magnesite is shipped. Hauling to the railway at Calumet is done by wagons or sleighs, the distances from the various quarries ranging from nine to sixteen miles.

At the quarries on lot 15, range IX, some of the magnesite is calcined in a Keystone lime kiln and shipped as caustic magnesia. The company also produced dead burned magnesite at Longue Pointe, near Montreal. The burning is accomplished in one of the rotary cement kilns of the Canada Cement Company, Limited.

The Scottish-Canadian Magnesite Company owns and operates quarries on lot 15, range X, and lot 15, range XI, Grenville township. The crude magnesite is transported to Grenville, a distance of 14 miles, over a narrow gauge railway. Dead burned magnesite is produced by this company at the plant of the Canada Cement Company, at Hull.

Ore reserves.—Dr. Wilson, in his report already referred to, makes the following summarized statement of the number of tons of magnesite and magnesite-dolomite in sight in the various properties referred to above.²

¹ "Magnesite deposits of Grenville District, Argenteuil county. Quebec," Memoir 98. Geological Surv., Dept. of Mines.

² It must be noted in this connexion that these estimates have no definite relationship to the amount of magnesite present on the various properties since some deposits have been more extensively developed by diamond drilling and other development operations.

Property.		Magnesite Containing less than 12 Per cent CaO tons.	Magnesite Containing more than 12 Per cent CaO tons.
Lot 13, range	I, Harrington township.. . . .	25,000	8,000
Lot 18, "	XI, Grenville township.. . . .	15,000	6,000
Lot 15, "	XI, " " " " " " " " " " " "	418,000	186,300
Lot 15, "	X, " " " " " " " " " " " "	2,500	4,000
Lot 15, "	IX, " " " " " " " " " " " "	226,400	279,400
Total.. . . .		686,900	483,700

Mining methods.—Quarrying is carried out by open cast methods the rock being broken down by blasting and sledging to "one man size." In working the quarries endeavour is made to avoid those parts of the deposits in which the lime content runs high. The quarried material is cobbled to free it from excessive amounts of serpentine and highly dolomitic rock.

Products marketed.—The magnesite is placed on the market in three forms: 1. Crude magnesite. 2. Light burned magnesite or caustic magnesia; and 3. Dead burned magnesite.

1. Crude magnesite is the hand-picked product of the quarry. It is shipped in lumps weighing 100 pounds or less.

2. Caustic magnesia or light burned magnesite is produced by calcining the crude rock in a retort or shaft kiln at a temperature of about 1100°C. The carbon dioxide is not completely driven off, about 2 or 3 per cent remaining. It is shipped in lump form or pulverized.

3. Dead burned magnesite is that from which practically all of the carbon dioxide has been expelled by calcining at a very high temperature. For the uses to which dead burned magnesite is put, it is desirable that it be fully shrunk, or in other words, in as dense a form as possible. The shrinkage is due to incipient fusion, or sintering. Since the Grenville magnesite contains such small quantities of fluxing impurities, it is practically impossible to shrink it without the previous addition of some other material. The practice at Hull and at Longue Pointe is as follows:—

Method of burning magnesite.—Crushed magnesite, mixed with approximately five per cent of its weight of oxide of iron, in the form of magnetite, is ground in a ball mill to a fineness of "100 mesh size". This finely ground and intimately mixed material is fed at a uniform rate into the rotary cement kiln, through which it passes in counter direction to the flames. During its passage through the kiln, which requires in the neighbourhood of three quarters of an hour, the magnesite yields its carbon dioxide and the residual magnesia combines with the oxide of iron. The result is the magnesia is rendered somewhat less refractory and, when subjected to the intense heat near the firing end of the kiln, the small particles soften slightly, shrink in bulk and develop a tendency to agglomerate. Small balls, averaging half an inch in diameter, are formed as the material is tumbled along its course through the rotating kiln. From the kiln they fall into a bucket conveyer which delivers them to the shipping shed.

Uses of magnesite.—The great bulk of magnesite consumed is used either in the caustic or dead burned state, the calcining being done by the mining companies or by firms making a business of preparing refractory materials for the market.

The crude rock is used in the preparation of various magnesian chemicals such as Epsom salt and magnesium chloride. It is used for the production of the metal magnesium by the electrolytic process. It is also employed in the manufacturing of wood pulp by the sulphite process. The magnesite may be used in the calcined form for the foregoing purposes.

When finely ground caustic magnesia is mixed with a solution of magnesium chloride it forms a cement known as Sorel, or oxychloride cement, which sets rapidly. This property has found for it a very extensive use as a flooring material.

The dead burned magnesite is used exclusively as a refractory material, especially for linings for open-hearth steel furnaces and for electric and other furnaces where a very high temperature is employed. These linings may be prepared in place by building up layer upon layer of magnesite to which some bonding material has been added and subjecting it, during the procedure to high temperature, or the magnesite may first be made up in the form of bricks and built into place in the usual manner."

Magnesium Sulphate.

Sulphate of magnesium, epsomite, or crude Epsom salt has been found in several localities in southern British Columbia.

Commercial shipments have been made during the past three years from a deposit near Kruger mountain, Osoyoos division, B.C., where the mineral is found in a flat depression known as Spotted Lake, which is a partially dried up lake containing alternate circles of water and dry places. The Stewart Calvert Company, Inc., of Oroville, Washington, has been operating this deposit and during the season of 1917 extracted about 2,600 short tons of crude magnesium sulphate salt of which about 925 tons valued at \$4,645 was hauled before December 31, to the company's works at Oroville where the crude salt is refined and prepared for the market. Shipments in 1916 were reported as 250 tons, and in 1915 about 300 tons.

In addition to the Spotted Lake deposit the same company is obtaining shipments during 1918 from a deposit near Clinton in Lillooet, B.C.

The greater part of the refined salt is used for industrial purposes, the tanning industry probably taking the largest proportion, though considerable amounts are also used in the textile industries and in the manufacture of dyes. About 20 per cent of the total shipments go to the drug trade.

Several lakes containing these salts have been observed on the Basque Ranch, near Ashcroft, and investigations of their probable commercial value are being made.

Metallic Magnesium.

The manufacture in Canada of metallic magnesium has been undertaken by the Shawinigan Electro Metals Company, Ltd., at Shawinigan Falls, Que. The metal is made from magnesium chloride salts which have been imported. It is proposed, however, to undertake the manufacture of these salts in Canada from Canadian magnesite.

MANGANESE.

The production of manganese ore in Canada has been small and irregular. During 1917 operations were continued at New Ross in Nova Scotia and shipments were made during the year amounting to 158 tons valued at \$14,836.

Annual Shipments of Manganese Ore.

Calendar Year.	Tons.	Value.	Value per ton.	Calendar Year.	Tons.	Value.	Value per ton.
		\$	\$			\$	\$
1886.....	1,789	41,499	23 20	1902*.....	172	4,062	23 62
1887.....	1,245	43,658	35 07	1903.....	91	2,775	30 49
1888.....	1,801	47,944	26 62	1904.....	66	2,740	41 51
1889.....	1,455	32,737	22 50	1905*.....	22	1,720	78 18
1890.....	1,328	32,550	24 51	1906*.....	93	925	9 95
1891.....	255	6,694	26 25	1907*.....	1	22	22 00
1892.....	115	10,250	89 13	1908.....	Nil.		
1893.....	213	14,578	68 44	1909.....	Nil.		
1894.....	74	4,180	56 49	1910.....	Nil.		
1895.....	125	8,464	67 71	1911.....	5½	300	54 55
1896*.....	123½	3,975	32 19	1912.....	75	1,875	25 00
1897*.....	15½	1,166	76 46	1913.....	Nil.	Nil.	
1898.....	50	1,600	32 00	1914.....	28	1,120	40 00
1899.....	1,581	20,004	12 65	1915.....	201	9,360	46 57
1900.....	30	1,800	60 00	1916.....	957	89,544	92 41
1901*.....	440	4,820	10 95	1917.....	158	14,836	93 90

* Exports.

The manganese ores which have been mined in Canada are pyrolusite, manganite, psilomelane, and bog manganese. These were mostly ores with a high manganese content, and fairly free from deleterious constituents. The largest part of the production was consequently put to those uses, where a high grade raw material is desired, e.g., as an oxidizing agent in the manufacture of chlorine, bromine, manganates, and permanganates; as decolorizer of glass, porcelain, and enamels; as a colouring material in dyeing and pottery and paint manufacture; as a drier in paints and varnishes, and in the manufacture of dry and Leclanche cells, etc.

Exports of Manganese Ore.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		\$			\$			\$
1906.....	93	925	1910.....	4	160	1914.....	30	750
1907.....	1	22	1911.....	4	225	1915.....	255	6,855
1908.....			1912.....	10	300	1916.....	957	89,544
1909.....	3	434	1913.....	8	303	1917.....	185	16,031

No separate record of manganese ores is kept in the classification of the Customs Department but statistics of imports of oxide of manganese are given. In 1917 these imports were 1,769 tons valued at \$92,616 or an average of \$62.36 per ton, as com-

pared with imports in 1913 of 1,170 tons valued at \$63,786 or an average of \$54.52 per ton. Imports of ferro-silicon, speigeleisen and ferro-manganese in 1917 were 12,828 tons valued at \$2,029,990 the corresponding imports for 1916 were 14,777 tons valued at \$1,879,508.

Imports of Oxide of Manganese.

Calendar Year.	Pounds.	Value.	Calendar Year.	Pounds.	Value.
1910.....	1,297,020	\$ 17,133	1914.....	3,404,863	\$ 42,287
1911.....	1,924,520	22,612	1915.....	2,476,328	46,678
1912.....	2,512,610	27,707	1916.....	2,339,809	63,786
1913.....	5,175,195	46,990	1917.....	3,538,623	92,616

MICA.

The total shipments of mica by mine operators in 1917, were 1,166 tons valued at \$358,851, or an average of \$307.76 per ton, as compared with shipments in 1916 of 1,208 tons valued at \$255,239, or an average of \$211.29 per ton. By provinces the production was, from Quebec 774 tons valued at \$286,730, or an average of \$370.45 per ton; Ontario 392 tons valued at \$72,121 or an average of \$183.98 per ton.

The statistics as to value of production should be considered with due regard to the conditions under which the industry is conducted. The condition in which mica is shipped from the mines varies greatly; one operator may ship his output cleaned and trimmed, while the output of another is in a rough cobbled state, with consequent noteworthy difference in prices realized. And further, companies operating trimming shops as well as mines may place only nominal value on shipments from mines to trimming shops.

Annual Production of Mica by Provinces.

Calendar Year.	Quebec.			Ontario			Total		
	Tons.	Value.	Per ton.	Tons.	Value.	Per ton.	Tons.	Value.	Per ton.
1909.....	128	\$ 93,298	\$ 728.89	241	\$ 54,484	\$ 226.07	369	\$147,782	\$ 400.49
1910.....	316	87,295	276.25	442	103,090	233.24	758	190,385	251.17
1911.....	217	69,465	320.12	373	59,212	158.75	590	128,677	218.10
1912.....	196	81,044	413.48	384	62,932	163.89	580	143,976	248.23
1913.....	626	125,488	200.46	478	68,816	143.97	1,104	194,304	176.00
1914.....	246	62,794	255.26	349	46,267	132.57	595	109,061	183.30
1915.....	217	50,390	232.21	200	41,515	207.58	417	91,905	220.40
1916.....	844	192,343	227.89	364	62,896	172.79	1,208	255,239	211.29
1917.....	774	286,730	370.45	392	72,121	183.98	1,166	358,851	307.76

Annual Production of Mica 1886-1908.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
1886.....	\$ 29,008	1894.....	\$ 45,581	1902.....	\$ 135,904
1887.....	29,816	1895.....	65,000	1903.....	177,857
1888.....	30,207	1896.....	60,000	1904.....	160,777
1889.....	28,718	1897.....	76,000	1905.....	178,235
1890.....	68,074	1898.....	118,375	1906.....	303,913
1891.....	71,510	1899.....	163,000	1907.....	312,599
1892.....	104,745	1900.....	166,000	1908.....	139,871
1893.....	75,719	1901.....	160,000		

Most of the various minerals of the mica group have been found in Canada. Lepidolite occurrences have been noted in British Columbia, Nova Scotia, and Quebec; biotite occurrences in Ontario and Quebec; muscovite occurrences in British Columbia, Manitoba, Nova Scotia, Ontario, and Quebec; and phlogopite occurrences in Baffinland, Ontario, and Quebec. Only the phlogopite (or amber mica) occurrences of Ontario and Quebec have been proven to be of economic interest. These have been

the subject of special investigation by the Mines Branch, Ottawa.¹ The muscovite occurrences at Tête Jaune Cache, and Big Bend in British Columbia have also been specially investigated by the Mines Branch,² but as yet they have made no production.

Canada's production of mica has come exclusively from two fields; one, in the Province of Quebec, a short distance to the north of the city of Ottawa, and the other embracing parts of the counties of Lanark, Leeds, and Frontenac, in the Province of Ontario. The city of Ottawa (and the adjacent city of Hull), lying between these two fields is the centre to which almost all the production of the various mines and numerous small prospects is shipped for trimming, grading and marketing. In preparation for the market a considerable proportion of the tonnage received is cobbled out and the mica split, trimmed, and otherwise manufactured, with the result that the exports, though of smaller tonnage than the shipments from the mines, usually exceed them in total value.

According to Customs records the exports of mica in 1917 were 636 tons valued at \$451,345. In 1916 the total exports were 654 tons, valued at \$379,720, of which 119 tons valued at \$81,913 were exported to Great Britain; 533 tons valued at \$296,221 to the United States; and 2 tons valued at \$1,586 to other countries.

Annual Exports of Mica.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
1906.....	912	\$581,919	1912.....	448	\$ 334,054
1907.....	558	422,172	1913.....	409	240,775
1908.....	290	198,839	1914.....	335	178,940
1909.....	359	256,834	1915.....	440	236,124
1910.....	469	330,903	1916.....	654	379,720
1911.....	347	242,548	1917.....	636	451,345

¹ "Mica: Its Occurrence, Exploitation and Uses." H. S. deSchmid, Mines Branch, Department of Mines, Ottawa, No. 118.

² Mines Branch, Department of Mines, Ottawa, Summary Report, 1913, page 42.

MINERAL PIGMENTS.

Iron Oxides—Ochres.

For many years there has been an annual production in the Province of Quebec of iron oxide from deposits situated between Champlain and Three Rivers, a short distance from the St. Lawrence river.

These oxides are marketed after calcining, as paint materials and are also sold crude for use in the purification of illuminating gas. The mineral paint is calcined, washed, and fine ground before shipment.

There was a small production during 1917 of zinc oxide for use as a pigment, the production being obtained at the oxide plant of the Canadian Zinc Products Co., Ltd., at Notre-Dame-Des-Anges. The record of production is included with that of ochres.

The total production of iron oxides and zinc oxide in 1917 was 9,409 tons valued at \$87,605. In 1916 the production of iron oxides was 8,811 tons valued at \$58,711.

Annual Production of Iron Oxides.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
1886.....	350	\$ 2,350	1902.....	4,955	\$30,495
1887.....	485	3,733	1903.....	6,266	32,760
1888.....	397	7,900	1904.....	3,925	24,995
1889.....	794	15,280	1905.....	5,105	34,675
1890.....	275	5,125	1906.....	6,758	36,125
1891.....	900	17,750	1907.....	5,828	35,570
1892.....	390	5,800	1908.....	4,746	30,440
1893.....	1,070	17,710	1909.....	3,940	28,093
1894.....	611	8,690	1910.....	4,813	35,185
1895.....	1,339	14,600	1911.....	3,622	28,333
1896.....	2,362	16,045	1912.....	7,654	32,410
1897.....	3,905	23,560	1913.....	5,987	41,774
1898.....	2,226	17,450	1914.....	5,890	51,725
1899.....	3,919	20,000	1915.....	6,248	48,353
1900.....	1,966	15,398	1916.....	8,811	58,711
1901.....	2,233	16,735	1917.....	9,409	87,605

The exports of mineral pigments, iron oxides, ochres, etc., in 1917, are reported as 1,451 tons valued at \$30,052 as compared with exports in 1916 of 1,696 tons valued at \$25,312.

Exports of Mineral Pigments, Iron Oxides and Ochres.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
1906.....	139	\$ 2,379	1912.....	3,016	\$ 34,513
1907.....	191	10,043	1913.....	1,956	18,931
1908.....	125	4,850	1914.....	1,777	22,311
1909.....	658	7,956	1915.....	1,196	17,263
1910.....	1,746	29,839	1916.....	1,696	25,312
1911.....	2,000	27,070	1917.....	1,451	30,052

Imports of mineral pigments are included under two classifications (1) ochres and ochrey earths, siennas and umbers, duty 20 per cent. and (2) oxides, roughstuffs, fillers, fireproofs and colours, dry, n.e.s., duty 25 per cent.

During 1917 imports under the first classification were 1,956 tons valued at \$59,864 and under the second classification 2,538 tons valued at \$357,638, or a total import of 4,494 tons valued at \$417,502.

Imports under the first classification during 1916 were 2,082 tons valued at \$51,771, and under the second classification 2,917 tons valued at \$357,487, or a total import of 4,999 tons valued at \$409,258.

Imports of lead and zinc pigments will be found recorded in the chapters on lead and zinc respectively.

Imports of Ochres and Pigments.

Calendar Year.	Ochres, ochrey earths, ⁽¹⁾ siennas and umbers.		Oxides, fillers, fireproofs, ⁽²⁾ roughstuffs and colours, dry, n.e.s.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1910.....	1,988,758	\$ 21,426	1,694,586	\$ 27,764	3,683,344	\$ 44,190
1911.....	2,576,261	31,736	1,584,508	22,286	4,160,769	54,022
1912.....	2,940,260	31,909	1,529,669	24,348	4,469,929	56,257
1913.....	3,325,566	43,119	8,774,448	240,435	12,100,014	283,554
1914.....	3,064,776	33,197	8,045,721	244,867	11,110,497	278,064
1915.....	2,479,853	23,763	4,904,725	260,986	7,384,578	284,749
1916.....	4,163,762	51,771	5,833,871	357,487	9,997,633	409,258
1917.....	3,912,694	59,864	5,075,333	357,638	8,988,027	417,502

(¹) 1910-1914 umbers and burnt siennas were included in (²).

MINERAL WATER.¹

The statistics of production given herewith represent, as usual, as closely as can be secured, the value of mineral water shipped from mineral springs in bottles, barrels, or other containers, and do not include any estimate of the value of mineral water used at springs for drinking or bathing purposes; nor are the natural pure spring waters included, of which a considerable quantity is sold in bottled form.

The value of the production in 1917 was \$145,814 as compared with \$127,806 in 1916; \$115,274 in 1915, and \$134,111 in 1914.

The imports of mineral and aerated waters during the calendar year 1917 were valued at \$108,444 and the exports of mineral water during the same year were valued at \$10,765.

Annual Production of Mineral Water.

Calendar Year.	Gals.	Value.	Calendar Year.	Gals.	Value.	Calendar Year.	Gals.	Value.
1888.....	124,850	\$ 11,455	1898.....	555,000	\$ 100,000	1908.....		\$151,953
1889.....	424,600	37,360	1899.....		100,000	1909.....		175,173
1890.....	561,165	66,031	1900.....		75,000	1910.....		199,563
1891.....	427,485	54,268	1901.....		100,000	1911.....		223,758
1892.....	640,380	75,348	1902.....		100,000	1912.....		172,465
1893.....	725,096	108,347	1903.....		100,000	1913.....		173,677
1894.....	767,460	110,040	1904.....		100,000	1914.....		134,111
1895.....	739,382	126,048	1905.....		100,000	1915.....		115,274
1896.....	706,372	111,736	1906.....		100,000	1916.....		127,806
1897.....	749,691	141,477	1907.....		136,020	1917.....		145,814

Annual Imports of Mineral Water.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
1910.....	\$202,306	1912.....	\$273,698	1914.....	\$199,327	1916.....	\$130,933
1911.....	229,367	1913.....	257,153	1915.....	126,569	1917.....	108,444

Annual Exports of Mineral Water.

Calendar Year.	Gallons.	Value.	In Bottles. Value.	Total.
1910.....	16,136	\$ 7,169		\$ 7,169
1911.....	26,495	12,952		12,952
1912.....	9,690	4,710		4,710
1913.....	3,640	526	\$ 970	1,496
1914.....	2,287	599	1,768	2,367
1915.....	198	53	3,525	3,578
1916.....	229	22	1,576	1,598
1917.....	75	20	10,745	10,765

¹ Two reports relating to mineral water, or mineral springs, have recently been published by the Mines Branch Department of Mines, Ottawa, viz:—

Report No. 435. Mineral Springs of Canada Part I. "The Radio-activity of some Canadian Mineral Springs," by John Satterly, M.A., D.Sc., and R. T. Elworthy, B.Sc., 1917.
Report No. 472. Mineral Springs of Canada, Part II. "The Chemical Character of some Canadian Mineral Springs," by R. T. Elworthy, B.Sc., 1918.

NATURAL GAS.

The total production of natural gas in Canada in 1917 was 27,408,940 thousand cubic feet valued at \$5,045,298, to which Ontario contributed 19,868,035 thousand cubic feet valued at \$3,641,587; Alberta 6,744,130 thousand cubic feet valued at \$1,299,976, and New Brunswick 796,775 thousand cubic feet valued at \$103,735.

The total production of natural gas in Canada in 1916 was 25,467,458 thousand cubic feet, valued at \$3,958,029, to which Ontario contributed 17,953,109 thousand cubic feet, valued at \$2,765,105; Alberta 6,904,231 thousand cubic feet, valued at \$1,113,296, and New Brunswick 610,118 thousand cubic feet, valued at \$79,628.

The value of the gas, as reported by producers, varies from 5 cents to 30 cents per thousand feet, but these prices do not represent what the consumer has to pay. In some cases the producer also owns the distribution pipe line and receives the full price paid by the consumer. In other cases the producer may sell to a pipe line company who either sells directly to consumers, or may in turn resell to other pipe line companies for retail distribution; in such cases as these the producer receives only a fraction of the amount paid by the consumer, but he is saved the expense of distribution. The statistics given herewith represent, as far as possible, the value received by the producer, or owner, of the gas wells, whether such producer be the owner of the distribution line or not.

The petroleum and natural gas resources of Canada have been the subject of special investigation by the Mines Branch, Ottawa, and two volumes comprising the results of this investigation have recently been issued.¹

Statistics of the production of natural gas in 1915, 1916, and 1917, and of the value of the annual production since 1892 follow:—

Natural Gas Production, 1917.

Province	No. Men.	Wages.	Wells, 1917.						Production		
			(a)	(b)	(c)	(d)	(e)	(f)	M. cu. ft.	Value.	Average.
										\$	\$
Quebec.....			6				6		nil.		
New Brunswick.	18	\$ 22,906	22	1	2	1	23	1	796,775	\$ 103,735	\$ 0.130
Ontario.....	435	374,385	1,901	135	49	108	1,928	23	19,868,035	3,641,587	0.183
Saskatchewan.								1			
Alberta.....	144	122,999	64	6	2	2	68	5	6,744,130	1,299,976	0.193
Total....	597	520,290	1,993	142	53	111	2,025	30	27,408,940	5,045,298	0.184

(a) Total number of productive wells at beginning of year.

(b) Number of productive wells drilled during year.

(c) " dry wells drilled during year.

(d) " wells abandoned during year.

(e) " productive wells at end of year.

(f) " wells on which drilling was in progress at end of year.

¹ "Petroleum and Natural Gas Resources of Canada," F. G. Clapp, Mines Branch, Dept. of Mines, Can., No. 291, Vol. I and Vol. II.

Natural Gas Production, 1916.

Province	No. Men.	Wages.	Wells, 1916.						Production		
			(a)	(b)	(c)	(d)	(e)	(f)	M. cu. ft.	Value.	Average.
Quebec.....	—	—	1	1	—	—	2	—	—	—	—
New Brunswick.....	12	\$ 13,193	22	—	—	—	22	1	610,118	\$ 79,628	\$0.131
Ontario.....	581	299,379	1480	139	44	74	1889	21	17,953,109	2,765,105	0.157
Saskatchewan.....	—	—	—	—	1	—	—	1	—	—	—
Alberta.....	157	220,341	56	—	—	—	56	5	6,904,231	1,113,296	0.161
Total.....	750	532,913	1559	140	45	74	1969	28	25,467,458	3,958,029	0.155

(a) Total number of productive wells at beginning of year.

(b) Number of productive wells drilled during year.

(c) " dry wells drilled during year.

(d) " wells abandoned during year.

(e) " productive wells at end of year.

(f) " wells on which drilling was in progress at end of year.

Annual Production of Natural Gas.

Calendar Year.	Value.	Calendar Year.	M. cu. ft.	Value.
1892.....	\$150,000	1905.....		\$ 379,561
1893.....	376,233	1906.....		583,523
1894.....	313,754	1907.....		815,032
1895.....	423,032	1908.....		1,012,660
1896.....	276,301	1909.....		1,207,029
1897.....	325,873	1910.....		1,346,471
1898.....	322,123	1911.....		1,907,678
1899.....	387,271	1912.....		2,362,700
1900.....	417,094	1913.....		2,309,381
1901.....	339,476	1914.....	21,692,504	3,484,727
1902.....	195,992	1915.....	20,124,162	3,706,035
1903.....	202,210	1916.....	25,467,458	3,958,029
1904.....	328,376	1917.....	27,408,940	5,045,298

PEAT.

No shipments of peat were reported in 1917. In 1916 about 300 tons, valued at \$1,500, were shipped from a bog in Middlesex county, Ontario. In 1915 shipments were made from the Alfred bog, Prescott county, amounting to 300 tons, valued at \$1,050.

Annual Production of Peat.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
1900.....	400	\$ 1,200	1909.....	60	\$ 240
1901.....	220	600	1910.....	841	2,604
1902.....	475	1,663	1911.....	1,463	3,817
1903.....	1,100	3,300	1912.....	700	2,900
1904.....	800	2,400	1913.....	2,600	10,100
1905.....	80	260	1914.....	685	2,470
1906.....	474	1,422	1915.....	300	1,050
1907.....	50	200	1916.....	300	1,500
1908.....	60	180	1917.....	Nil.	Nil.

The following is a list of publications on peat issued by the Mines Branch, Ottawa:—

Report No. 19. "Peat and Lignite, their Manufacture and Uses in Europe," by Erick Nystrom, M.E., 1908. (Out of print.)

Report No. 30. "Investigation of the Peat Bogs and Peat Fuel Industry of Canada, 1908." Bulletin No. 1, by Erick Nystrom and A. Anrep.

Report No. 71. Investigation of the peat bogs, and peat industry of Canada, 1909-10; to which is appended Mr. Alf. Larson's paper on Dr. M. Ekenberg's wet-carbonizing process; from Teknisk Tidskrift, No. 12, December 26, 1908—translation by Mr. A. Anrep; also a translation of Lieut. Ekelund's pamphlet entitled "A solution of the peat problem," 1909, describing the Ekelund process for the manufacture of peat powder, by Harold A. Leverin, Ch. E. Bulletin No. 4—by A. Anrep. (Second edition, enlarged.) (Out of print.)

Report No. 90. Reprint of Presidential Address delivered before the American Peat Society at Ottawa, July 25, 1910, by Eugene Haanel, Ph.D.

Report No. 151. Investigation of the Peat Bogs and the Peat Industry of Canada, 1910-1911. Bulletin No. 8, by A. Anrep.

Report No. 154. The Utilization of Peat Fuel for the Production of Power, being a record of experiments conducted at the Fuel Testing Station, Ottawa, 1910-1911. Report on—by B. F. Haanel, B.Sc.

Report No. 266. Investigation of the Peat Bogs and the Peat Industry, 1911-1912. Bulletin No. 9, by A. Anrep, Peat Expert.

Report No. 299. Peat, Lignite and Coal. Their value as Fuels for the Production of Gas and Power in the By-Product Recovery Producer. Report by B. F. Haanel, B.Sc.

Report No. 351. "Investigation of the peat bogs and the peat industry of Canada, 1913-1914." Bulletin No. 11. A. Anrep.

Report No. 447. "The value of Peat Fuel for the Generation of Steam." Bulletin No. 17, by John Blizard, B.Sc.

PETROLEUM.

The production of petroleum during 1917 was slightly greater than that of the previous year due to the development of the new Mosa field in Ontario. The present annual production, however, is only half that obtained in 1909 and less than one-third the average production from 1887-1905.

The comparatively small proportion of Canadian oil consumption obtained from domestic sources was made the subject of special comment in last year's report and may be again stated. The imports of crude and refined oils in 1917 were 379,150,000 gallons and the domestic production 7,484,120 gallons. The exports were only 80,728 gallons. The approximate Canadian consumption was, therefore, 386,550,000 gallons, of which less than 2 per cent was from domestic production.

About 85 per cent of the total imports is in the form of crude oil of which a little over one-half is imported for the use of Canadian oil refineries. Approximately 80 per cent of the total consumption of refined oils is now produced in refineries situated in Canada.

The total Canadian production of crude petroleum in 1917 (based upon bounty payments) was 7,484,120 imperial gallons (213,832 barrels of 35 gallons), valued at \$542,239, as compared with a production in 1916 of 6,934,288 gallons (198,123 barrels), valued at \$392,284.

The production of crude oil has come almost solely from Ontario. New Brunswick has been a producer for about ten years to the extent of less than 3,000 barrels annually. There has been a small production in Alberta during each of the past four years and the quantity obtained in 1917 is estimated at about 8,500 barrels.

Previous to 1917 no attempt had been made to obtain complete returns of crude oil production direct from the well operators. The Dominion Government has, since 1905, offered and paid a bounty on the production of crude petroleum at the rate of 1½ cents per Imperial gallon and the records of these bounty payments which are made through the Department of Trade and Commerce have furnished a very accurate record of Canadian oil production. Previous to the payment of bounty the production records were estimated on the basis of receipts at refineries.

The New Brunswick production as shown by bounty payments was 95 barrels in 1909; 1,485 barrels in 1910; 2,461 barrels in 1911; 2,679 barrels in 1912; 2,111 barrels in 1913; 1,725 barrels in 1914; 1,020 barrels in 1915; 1,345 barrels in 1916, and 2,341 barrels in 1917.

New Brunswick petroleum production has been confined to Albert county, where at present The New Brunswick Gas and Oil-Fields, Limited, are the only operators. The properties of this company, formerly the Maritime Oil-Fields, Limited, having developed a very considerable flow of gas, the operators have been concentrating their energies on gas development. New Brunswick possesses large deposits of undeveloped bituminous shales richer in oil than the Scottish shales which have been exploited for many years at a profit.

The production in Ontario in 1917 was 202,991 barrels, valued at \$473,447, as against a production in 1916 of 196,778 barrels, valued at \$389,621, and a production in 1915 of 214,444 barrels, valued at \$299,149.

The increased production in Ontario has been practically all attributable to the output obtained from the new field in Mosa township, Middlesex county, from which nearly 20,000 barrels were obtained during 1917, and from the Thamesville field, from which over 6,000 barrels were obtained.

In Alberta oil production is reported from five wells in 1917. Most of the oil is too light to come within the specification of the Petroleum Bounty Act, and the record

of production estimated at 8,500 barrels, valued at \$63,302, has been obtained directly from operators. The producing wells are located near Black Diamond, and the oil was delivered to oil distributing plants at Black Diamond and Okotoks.

Statistics in respect to oil wells have been obtained for the first time directly from well operators as covering the year 1917. The record which is tabulated below shows not only the quantity of oil disposed of during the year but also a record of the number of active or productive wells, the number of new wells drilled and wells abandoned. Other data respecting the depths of wells, etc., has been secured which cannot be tabulated.

The shipments of oil as shown in this record are from the Province of Ontario slightly less than that shown by bounty payments and are probably incomplete. In valuing shipments some operators have apparently included bounty received.

The New Brunswick shipments are shown to be in excess of the production as determined by bounty payments, the difference being caused by the accumulation of the greater part of the 1916 production which was marketed in 1917.

According to the returns received the total number of productive oil wells owned at the beginning of the year by 168 firms and individuals reporting were 4,231, and the number of active wells at the end of the year, 4,036. Wells drilled by oil companies during the year included 40 oil wells, 2 gas wells, and 13 dry wells. The number of wells abandoned during the year was 164 and 10 wells were reported as in process of drilling at the close of the year.

Oil Wells and Oil Shipments, 1917.

Province.	Men Em- ployed.	Wages Paid.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Oil Shipped.		
										Barrels.	Value.	Average Value.
		\$									\$	\$
New Brunswick	*	*	7	1	.....	1	.....	7	1	4,232	8,395	1.98
Ontario	258	152,005	4,220	39	2	12	163	4,024	5	194,167	494,317	2.55
Alberta	12	15,200	4	.....	.....	.....	1	5	4	8,500	63,302	7.45
Total	270	167,205	4,231	40	2	13	164	4,036	10	206,899	566,014	2.74

* Included with natural gas statistics.

(a) Number of productive wells at beginning of year.

(b) Number of oil wells drilled during year.

(c) Number of gas wells drilled during year.

(d) Number of dry wells drilled during year.

(e) Number of wells abandoned during year.

(f) Total number of productive wells at end of year.

(g) Number of wells on which drilling was still in progress at end of year.

The statistics of production of crude petroleum given in the following table are for the years previous to 1905 based upon receipts of crude oil at refineries and for the years 1905 to 1917 inclusive are based upon bounty claims.

Annual Production of Crude Petroleum.

Year.	Barrels of 35 Gallons	Value.	Average.	Year.	Barrels of 35 Gallons.	Value.	Average.
1881.....	368,987			1899.....	808,570	\$1,202,020	\$1.48 $\frac{3}{4}$
1882.....	389,573			1900.....	710,498	1,151,007	1.620
1883.....	472,866			1901.....	622,392	1,008,275	1.620
1884.....	571,000			1902.....	530,624	951,190	1.792
1885.....	587,563			1903.....	486,637	1,048,874	2.155
1886.....	584,061	\$ 525,655	\$0.90	1904.....	503,474	935,895	1.858
1887.....	713,728	556,708	0.78	1905.....	634,095	856,028	1.350
1888.....	695,203	713,695	1.02 $\frac{3}{8}$	1906.....	569,753	761,760	1.337
1889.....	704,690	653,600	0.92 $\frac{3}{8}$	1907.....	788,872	1,057,088	1.340
1890.....	795,030	902,734	1.18	1908.....	527,987	747,102	1.415
1891.....	755,298	1,010,211	1.33 $\frac{3}{8}$	1909.....	420,755	559,604	1.330
1892.....	779,753	984,438	1.26 $\frac{1}{4}$	1910.....	315,895	388,550	1.230
1893.....	798,406	874,255	1.09 $\frac{1}{2}$	1911.....	291,092	357,073	1.225
1894.....	829,104	835,322	1.00 $\frac{3}{4}$	1912.....	243,336	345,050	1.418
1895.....	726,138	1,086,738	1.49 $\frac{3}{8}$	1913.....	228,080	406,439	1.782
1896.....	726,822	1,155,647	1.59	1914.....	214,805	343,124	1.597
1897.....	709,857	1,011,546	1.42 $\frac{1}{2}$	1915.....	215,464	300,572	1.395
1898.....	758,391	1,061,747	1.400	1916.....	198,123	392,284	1.98
				1917.....	213,832	542,239	2.333

Record of Bounty Paid by Dominion Government on Production of Crude Petroleum.

Calendar Year.	Bounty Paid.	Calendar Year.	Bounty Paid.	Calendar Year.	Bounty Paid.	Calendar Year.	Bounty Paid.
1905.....	\$332,900	1909.....	\$220,897	1912.....	\$127,751	1915.....	\$112,577
1906.....	299,120	1910.....	165,845	1913.....	119,742	1916.....	104,014
1907.....	414,158	1911.....	152,823	1914.....	112,569	1917.....	107,799
1908.....	277,193						

The production of crude oil in the Province of Ontario by districts since 1906 is shown in the following table. The record has been furnished by the Supervisor of Petroleum Bounties at Petrolia and agrees very closely though not identically with the production records based on bounty claims as furnished by the Department of Trade and Commerce at Ottawa.

Production of Crude Petroleum in Ontario, Monthly, by Districts, 1917.

Months.	Petrolia and Enniskillen.	Oil Springs.	Sarnia Tp.	Moore Tp.	Plympton Tp.	Bothwell.
	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.
January.....	210,114	145,772	8,729	12,028	3,259	91,617
February.....	181,861	105,633	12,181	8,316	1,639	59,247
March.....	178,221	81,663	11,358	15,093	.....	45,815
April.....	230,189	191,116	14,241	16,716	1,080	145,951
May.....	231,735	152,609	6,890	28,100	1,254	81,738
June.....	259,559	134,059	19,460	22,872	2,552	88,940
July.....	198,809	144,041	7,728	9,814	1,688	104,302
August.....	244,535	155,041	11,409	18,164	1,873	107,492
September.....	189,769	113,620	7,182	17,884	.....	85,443
October.....	236,511	153,539	24,301	29,181	4,103	70,045
November.....	230,957	124,544	24,155	31,996	2,822	106,645
December.....	207,094	139,937	9,642	9,713	.....	51,649
Totals 1917.....	2,599,354	1,641,574	157,276	219,877	20,270	1,038,884

Months.	Dutton.	Tilbury.	Onondaga.	Mosa Tp.	Thamesville.	Totals.
	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.
January.....	12,047	46,356	.....	.....	37,741	567,663
February.....	.....	14,743	.....	.....	12,582	396,202
March.....	5,039	26,208	.....	4,061	15,888	383,346
April.....	.....	34,697	.....	.....	28,067	162,057
May.....	8,905	41,400	.....	10,032	10,851	573,564
June.....	20,038	35,802	.....	47,908	58,153	689,343
July.....	9,963	9,817	.....	70,977	25,958	583,097
August.....	15,122	29,402	.....	43,126	9,945	636,109
September.....	5,611	25,119	9,071	14,371	4,113	472,183
October.....	18,897	22,102	1,104	241,133	5,774	806,690
November.....	.....	14,417	.....	179,853	5,111	720,500
December.....	7,330	51,380	3,229	123,441	10,531	613,946
Totals 1917.....	102,952	351,443	13,404	734,952	224,714	7,104,706

Production of Crude Petroleum in Ontario by Districts, 1906-1917.

Field.	1906.	1907.	1908.	1909.	1910.	1911.
	Bls.	Bls.	Bls.	Bls.	Bls.	Bls.
Lambton.....	377,286	304,212	265,368	243,123	205,456	184,450
Tilbury and Romney.....	106,992	411,538	201,286	124,003	63,058	48,707
Bothwell.....	44,827	42,727	39,228	38,092	36,998	35,244
Leamington.....	39,655	6,135	9,334	5,929	141	.....
Dutton.....	19,376	14,977	13,743	9,513	7,752	6,732
Thamesville (a).....	175	237	.....	.....	.....	.....
Comber.....	651	.....	.....	.....	.....	.....
Onondaga (Brant county).....	.....	.....	.....	.....	1,005	13,501
Total.....	588,962	779,876	528,959	420,660	314,410	288,634

Field.	1912.	1913.	1914.	1915.	1916.	1917.
	Bls.	Bls.	Bls.	Bls.	Bls.	Bls.
Lambton.....	150,272	155,747	154,186	161,368	142,208	132,523
Tilbury and Romney.....	44,727	26,824	18,530	12,742	16,297	10,041
Bothwell.....	34,486	34,348	33,961	33,395	33,856	29,682
Leamington.....	.....	.....	.....	.....	.....	.....
Dutton.....	4,335	4,610	2,190	5,401	2,852	2,941
Onondaga (Brant county).....	7,115	4,172	2,437	1,490	1,617	382
Belle River.....	.....	464	1,191	46	47	.....
Mosa Township.....	.....	.....	.....	.....	.....	20,998
Thamesville (a).....	.....	.....	.....	.....	.....	6,420
Total.....	240,935	226,165	212,495	214,442	196,877	202,987

(a) A small occasional production from the District of Thamesville during the years 1908 to 1916 is included with that of Bothwell.

Petroleum Refining.

Nine oil refineries in Canada used in 1917 a total of 199,256,799 gallons of crude oil, of which 190,822,740 gallons were imported and 8,434,059 gallons were obtained from Canadian wells. The production of refined oils and petroleum products during the year included: gasoline, benzoline, benzene and other light oils 54,114,786 gallons; illuminating oils 49,144,564 gallons; lubricating oils 14,332,549 gallons; gas and fuel oils and tar 55,643,707 gallons; wax and candles 13,517,627 pounds, with asphalt and other products. The total value of the products of refineries was \$25,137,143.

All refined illuminating oils and naphtha manufactured and shipped from Canadian refineries are inspected by the Department of Inland Revenue. The total quantity inspected during the fiscal year ending March 31, 1918, was 101,100,502.64 gallons as compared with 76,818,608.29 gallons inspected during the fiscal year 1917.

The following table showing the quantities of illuminating oils and naphtha inspected in the several districts is quoted from the Annual Report of the Department of Inland Revenue.

Return of Inspected Petroleum and Naphtha Shipped from Refineries During the Fiscal Year Ending March 31, 1918.

Divisions.	Petroleum.	Naphtha.	Total.
	Gals.	Gals.	Gals.
Montreal, Que.....	2,365,398.00	4,476,187.00	6,841,585.00
London, Ont.....	29,535,801.21	32,248,938.23	61,834,739.44
Toronto, Ont.....	1,346,732.00	2,405,304.00	3,752,036.00
Moosejaw, Sask.....	4,892,115.70	9,566,957.70	14,459,073.40
Calgary, Alta.....	34,630.50	362,859.00	397,489.50
Vancouver, B.C.....	2,873,366.50	10,942,212.80	13,815,579.30
Total.....	41,098,043.91	60,002,458.73	101,100,502.64

Comparative Statement of Inspected Petroleum and Naphtha Shipped from Canadian Refineries During the Fiscal Years Ending March 31, 1910-1918.

Fiscal year.	Petroleum.	Naphtha.	Total.
	Gals.	Gals.	Gals.
1910.....	19,100,424.16	4,113,149.46	*23,213,573.62
1911.....	21,017,628.45	6,517,655.41	*27,535,283.86
1912.....	20,886,072.43	5,577,591.62	*26,463,664.05
1913.....	22,485,437.34	6,880,761.85	*29,366,199.19
1914.....	22,986,328.66	10,615,688.61	*33,602,017.27
1915.....	31,117,405.08	15,265,380.01	46,382,785.09
1916.....	34,775,554.81	29,238,843.98	64,014,398.79
1917.....	35,836,338.35	40,982,269.94	76,818,608.29
1918.....	41,098,043.91	60,002,458.73	101,100,502.64

*All from Ontario Refineries.

Exports and Imports.

The exports of petroleum from Canada are comparatively small, the total of both crude and refined oils being in 1917 only 80,728 gallons valued at \$20,535.

The imports on the other hand as already stated supply over 98 per cent of Canada's requirements. A detailed statement of imports during 1916 and 1917 and a summary of imports from 1910 to 1917 will be found in the following tables.

Exports of Crude and Refined Petroleum.

Calendar Year.	Crude Oil.		Refined Oil.		Total.	
	Gals.	Value.	Gals.	Value.	Gals.	Value.
1908.....			296	\$ 71	296	\$ 71
1909.....			7,768	934	7,768	934
1910.....			2,818	462	2,818	462
1911.....			24,448	4,500	24,448	4,500
1912.....	18,500	\$ 3,964	62,736	10,408	81,236	14,372
1913.....	3,650	379	* 42,148	7,472	45,798	7,851
1914.....	3,996	362	46,945	12,433	50,941	12,795
1915.....	35,977	1,789	120,132	18,647	156,109	20,436
1916.....	137,647	11,439	501,401	62,331	639,048	73,770
1917.....	28,212	6,558	52,516	13,977	80,728	20,535

*Includes naphtha and gasoline from 1913 to date.

Imports of Petroleum and Petroleum Products During the Calendar Years 1916 and 1917.

Products.	1916		1917	
	Gals.	Value.	Gals.	Value.
Crude petroleum in its natural state, .7900 specific gravity or heavier at 60 degrees temperature, when imported by oil refineries to be refined in their own factories.	252,981,211	\$8,452,580	183,105,102	\$8,411,730
Petroleum, (not including crude petroleum imported to be refined, or illuminating or lubricating oils) .8235 specific gravity or heavier at 60 degrees temperature.			142,524,473	5,958,930
Crude petroleum, gas oils (other than benzene, naphtha and gasoline).....	112,059	7,242	854,778	65,404
Coal and kerosene, distilled, purified, or refined.....	7,912,419	474,442	13,258,815	978,366
Illuminating oils composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon.....	167,688	68,451	198,281	115,194
Lubricating oils composed wholly or in part of petroleum, costing less than 25 cents per gallon.....	4,239,675	597,733	3,438,430	559,605
Products of petroleum, n.o.p.....	7,464,777	1,003,577	18,521,574	2,708,395
Lubricating oils, n.o.p.....	1,226,401	375,520	1,877,381	650,325
Gasoline.....	18,321,891	3,624,931	15,369,172	3,293,760
Total.....	292,426,121	14,604,476	379,148,006	22,741,709
Paraffin wax.....	Pounds. 1,061,112	70,308	Pounds. 1,620,634	140,722
Paraffin wax candles.....	220,264	30,539	513,337	75,257
Total.....		14,705,323		22,957,688

Annual Import of Crude Petroleum, Gasoline, Illuminating Oils, Lubricating Oils, Etc.

	Crude Petroleum.		Gasoline.		Coal-kerosene and other Illuminating Oils.	
	Gallons.	Value.	Gallons.	Value.	Gallons.	Value.
1910.....	53,604,053	\$1,639,358	16,679,691	\$1,693,296	7,656,727	\$ 502,364
1911.....	71,653,251	2,188,870	23,338,773	1,976,032	13,690,962	722,403
1912.....	120,082,405	3,996,842	40,904,598	5,347,767	14,748,218	1,012,735
1913.....	162,061,926	5,250,835	29,525,180	4,822,941	19,393,627	1,394,440
1914.....	195,207,210	5,750,971	24,396,401	2,747,360	12,833,065	970,481
1915.....	192,538,487	3,678,021	28,030,972	2,693,717	6,792,873	405,019
1916.....	253,093,270	8,469,822	18,321,891	3,624,931	8,080,107	542,893
1917.....	326,484,353	14,436,064	15,369,172	3,293,760	13,457,096	1,093,560
	Lubricating Oils.		Other Oils, Products of Petroleum.		Totals.	
1910.....	4,081,257	718,381	2,607,606	273,364	84,629,334	4,826,763
1911.....	5,308,917	806,452	2,900,786	315,973	116,892,689	6,009,730
1912.....	6,763,800	1,077,712	4,288,463	423,477	186,787,484	11,858,533
1913.....	6,789,451	1,172,986	5,008,844	597,227	222,779,028	13,238,429
1914.....	5,767,676	940,143	6,283,621	663,407	244,487,973	11,072,362
1915.....	4,547,179	755,535	4,954,254	446,972	236,913,765	7,979,264
1916.....	5,466,076	973,253	7,464,777	1,003,577	300,405,385	14,614,476
1917.....	5,315,811	1,209,930	18,521,574	2,708,395	379,148,006	22,741,709

Imports of Paraffin Wax and Wax Candles.

Calendar Year.	Wax.		Wax Candles.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1910.....	1,192,616	\$ 58,673	169,619	\$ 21,433	1,362,235	\$ 80,106
1911.....	1,688,216	75,661	271,571	30,763	1,959,787	106,424
1912.....	1,901,586	85,491	242,420	34,029	2,144,006	119,520
1913.....	1,291,615	72,351	337,222	37,546	1,628,837	109,897
1914.....	1,218,969	57,527	375,267	44,874	1,594,236	102,401
1915.....	756,234	40,965	224,428	27,552	980,662	68,517
1916.....	1,061,112	70,303	220,264	30,539	1,281,376	100,847
1917.....	1,620,634	140,722	513,337	75,257	2,133,971	215,979

PHOSPHATE.

The small production of phosphate, or apatite which has been obtained in Canada since 1896 has been produced almost altogether as a by-product in connexion with the mining of mica. Shipments during 1917 totalled 149 tons valued at \$1,486, as compared with 203 tons valued at \$2,514 in 1916.

Phosphate is used at Buckingham, Que., in the manufacture of fertilizers, phosphorus and ferro-phosphorus and the main supply of ore is obtained from Florida.

Annual Production of Phosphate.

Calendar Year.	Tons.	Value.	Average value per ton.	Calendar Year.	Tons.	Value.	Average value per ton.
1886.....	20,495	\$304,338	\$14.85	1902.....	856	\$ 4,953	\$ 5.79
1887.....	23,690	319,815	13.50	1903.....	1,329	8,214	6.18
1888.....	22,485	242,285	10.77	1904.....	817	4,590	5.62
1889.....	30,988	316,662	10.21	1905.....	1,300	8,425	6.48
1890.....	31,753	361,045	11.37	1906.....	850	6,375	7.50
1891.....	23,588	241,603	10.24	1907.....	824	6,018	7.30
1892.....	11,932	157,424	13.20	1908.....	1,596	14,794	9.26
1893.....	8,198	70,942	8.65	1909.....	998	8,054	8.07
1894.....	6,861	41,166	6.00	1910.....	1,478	12,578	8.51
1895.....	1,822	9,565	5.25	1911.....	621	5,206	8.38
1896.....	570	3,420	6.00	1912.....	164	1,640	10.00
1897.....	908	3,984	4.39	1913.....	385	3,643	9.46
1898.....	733	3,665	5.00	1914.....	954	7,275	7.63
1899.....	3,000	18,000	6.00	1915.....	217	2,502	11.53
1900.....	1,415	7,105	5.02	1916.....	203	2,514	12.38
1901.....	1,033	6,280	6.07	1917.....	149	1,486	10.00

Exports of phosphate and imports of phosphate rock, acid phosphate and phosphorus are given in the tables:—

Exports of Phosphate.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
1908.....	1	\$ 30	1912.....			1915.....	179	\$1,860
1909.....	895	15,735	1913.....			1916.....	103	1,543
1910.....			1914.....	247	\$677	1917.....	14	200
1911.....	3	100						

Imports of Acid Phosphate and Phosphorus.

Calendar Year.	Phosphate rock (fertilizer.)	Acid phosphate.		Phosphorus.	
		Pounds.	Value.	Pounds.	Value.
1910.....	\$ 72,950	1,379,173	\$ 55,999	6,752	\$ 2,605
1911.....	46,217	1,334,643	60,882	14,818	4,384
1912.....	24,586	1,379,173	55,999	13,807	4,012
1913.....	16,070	1,987,775	89,543	17,600	5,856
1914.....	20,220	1,874,486	97,862	20,994	6,760
1915.....	14,148	1,964,131	105,035	75,900	29,572
1916.....	16,182	2,751,941	146,910	95,543	42,738
1917.....	62,543	2,879,678	209,298	71,975	34,519

PYRITES.

The total shipments of pyrites as sulphur ore in 1917 were 416,649 tons valued at \$1,610,762 as compared with shipments in 1916 of 309,251 tons valued at \$1,084,095, showing an increase of 107,398 tons, or 34.7 per cent in quantity and \$526,667 or 48.6 per cent in value.

Sulphuric acid is possibly the most important of chemical products and being essential to the manufacture of explosives and required in so many metallurgical and industrial activities the demand for sulphur and pyrites, or sulphur ore, absorbed all available supplies. United States requirements of pyrites had been met by large importations of Spanish pyrites, but high freight rates and shortage of ocean tonnage contributed to a serious reduction in these supplies.

Three provinces contributed to the production in 1917. Shipments in Quebec were 122,882 tons valued at \$501,351; Ontario 288,058 tons valued at \$1,080,866 and British Columbia 5,709 tons valued at \$28,545.

The ores shipped varied from 29 to 48.6 per cent in sulphur, the total sulphur content of the year's shipments being 155,163 tons, or an average of 37.2 per cent.

In 1916 Quebec shipments were 130,639 tons valued at \$523,272; Ontario 177,552 tons valued at \$555,523, and British Columbia 1,060 tons valued at \$5,300.

In the Province of Quebec shipments of cupriferous pyrites were made as usual from the Eustis and Weedon mines in the Eastern Townships operated respectively by the Eustis Mining Company and the Weedon Mining Company.

The shipping mines in Ontario were the Sulphide, North Pines, and Goudreau mines operated by the Nichols Chemical Company, the Queensboro Mine operated by the Canadian Sulphur Ore Company, the Helen Mine of the Algoma Steel Corporation, Limited, and the Rand Consolidated Mines, Limited, operating at Goudreau.

In British Columbia shipments were made by the Consolidated Mining & Smelting Co., Limited, from Sullivan Mine to the company's acid plant at Trail, and by the Granby Consolidated Mining, Smelting & Power Co., Ltd., from Anxox, to the acid plant at Barnett, B.C.

Monthly Shipments of Pyrites During 1917.

(Ton of 2,000 pounds.)

Month.	Ores and Concentrates Shipped.			Average Sulphur content.	Total Sulphur content.
	To Destina- tions in Canada.	To Destina- tions in U.S.	Total Shipments.		
	Tons.	Tons.	Tons.	per cent.	Tons.
January	2,653	4,128	6,781	39.8	2,703
February	5,136	5,714	8,850	40.3	3,568
March	5,846	4,986	10,832	42.9	4,338
April	4,597	9,999	14,596	39.8	5,819
May	5,080	36,796	41,876	36.0	15,106
June	5,228	29,745	34,973	37.4	13,109
July	3,262	38,324	41,586	37.0	15,410
August	4,270	68,779	73,049	36.8	26,890
September	3,331	45,796	49,127	36.6	17,997
October	4,118	44,782	48,900	36.1	17,701
November	3,472	59,560	63,032	36.8	23,219
December	4,327	18,720	23,047	40.3	9,303
Total	49,320	367,329	416,649	37.2	155,163

Annual Production of Pyrites.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
1886.....	42,906	\$ 193,077	1897.....	38,910	\$ 116,730	1908.....	47,336	\$ 224,824
1887.....	38,043	171,194	1898.....	32,218	128,872	1909.....	64,644	222,814
1888.....	63,479	285,656	1899.....	27,687	110,748	1910.....	53,870	187,062
1889.....	72,225	307,292	1900.....	40,031	155,164	1911.....	82,666	365,820
1890.....	49,227	123,067	1901.....	35,261	130,544	1912.....	81,526	314,081
1891.....	67,731	203,193	1902.....	35,616	138,939	1913.....	158,566	521,181
1892.....	59,770	179,310	1903.....	33,982	127,713	1914.....	228,314	744,508
1893.....	58,542	175,626	1904.....	37,180	134,033	1915.....	286,038	985,190
1894.....	40,527	121,581	1905.....	33,339	125,486	1916.....	309,251	1,084,095
1895.....	34,198	102,594	1906.....	42,743	169,990	1917.....	416,649	1,610,762
1896.....	33,715	101,155	1907.....	46,243	212,491			

It will be noted that according to direct returns received from the operators 49,320 tons were sold for domestic consumption and 367,329 tons for export to the United States.

This is considerably in excess of the Customs record of exports as shown in the accompanying table. It is just possible that some of the cupriforous pyrites may have been entered for export as a copper ore.

The imports of crude sulphur during the calendar year 1917 were 82,445 tons valued at \$1,515,309, as compared with imports in 1916 of 73,467 tons valued at \$1,186,618.

Most of the sulphur is used in the manufacture of sulphuric acid and in the manufacture of pulp and paper. The acid manufacturers in 1917 used 25,994 tons.

Exports of Pyrites.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
1906.....	26,050	\$ 65,349	1910.....	30,434	\$ 110,071	1914.....	89,999	\$ 377,985
1907.....	25,056	80,139	1911.....	32,102	120,585	1915.....	137,598	527,318
1908.....	17,283	96,600	1912.....	5,938	11,935	1916.....	156,722	557,024
1909.....	35,798	156,644	1913.....	46,066	211,640	1917.....	279,646	974,200

Imports: Brimstone* and Crude Sulphur.

Calendar Year.	Pounds.	Value.	Calendar Year.	Pounds.	Value.
1910.....	45,669,739	\$ 474,619	1914.....	83,907,805	\$ 870,868
1911.....	43,862,954	446,491	1915.....	60,364,184	480,317
1912.....	77,294,039	806,690	1916.....	146,934,925	1,186,618
1913.....	60,865,975	633,114	1917.....	164,890,150	1,515,309

* Brimstone, crude or in roll or flour, or sulphur in roll or flour.

Sulphuric Acid.

Sulphuric acid is manufactured in different grades, or strengths, and in recording statistics of production it is desirable for purposes of comparison that the quantities of the several grades should be reduced as far as possible to a uniform standard.

The strength of sulphuric acid is measured according to the percentage of sulphur trioxide (SO_3), or pure sulphuric acid (H_2SO_4), contained. The scale of measurement employed in Canada and the United States is that known as the Baume Hydrometer scale, and the principal grades of acid manufactured are generally referred or reduced to the following standards, 50° Baume acid, also known as Chamber acid, containing an average of 62.18 per cent of H_2SO_4 ; 60° Baume acid, containing an average of 77.67 per cent of H_2SO_4 ; 66° Baume acid or oil of vitriol, containing 93.19 per cent H_2SO_4 . Acids stronger than 66° Be. should have their percentage compositions determined by chemical analyses.¹ These stronger acids appear under various names, including pyrosulphuric acid, fuming or Nordhausen acid, Oleum, etc.

Production records have been obtained in terms of the standard grades 50° Be., 60° Be., 66° Be., and stronger acids. The quantities of the first two grades have, however, in the following statistics been reduced to their equivalent in 66° Be. acid.

The total production of sulphuric acid in Canada during the twelve months ending December 31, 1917, derived from ten producing plants was 153,530 short tons, as compared with a production in 1916 of 124,920 tons, and a production in 1915 of 75,838 tons. During the first six months of 1917 the production was 65,258 tons, and during the last six months of that year 88,272 tons. The production during the first six months of 1918, which record is now available, was 94,383 tons.

The ores used in the manufacture of sulphuric acid in 1917 included 25,994 tons of imported sulphur, or brimstone, and 66,128 tons of pyrites chiefly from Canadian mines, but including 12,690 tons imported.

Complete statistics of the production of sulphuric acid in Canada were collected by this Department for 1917, covering the annual production during the years 1912 to 1916, inclusive. The annual production from 1912 to 1917 is shown in the accompanying table:—

Annual Production of Sulphuric Acid in Canada, 1912-1918.

Calendar Year.	Sulphuric acid made, in terms of 66° Bé. acid.*	Ores used in the production of acid	
		Sulphur.	Pyrites.
	Short tons.	Short tons.	Short tons.
1912.....	44,651	4,773	27,680
1913.....	47,227	4,281	31,774
1914.....	41,919	2,227	33,331
1915.....	75,838	4,716	55,586
1916.....	124,920	20,566	62,681
1917.....	153,530	25,994	66,128
1918 (1st six months).....	94,383	12,887	37,845

* Record includes a small production of Oleum and other grades, the strength of which is not specified. An approximate estimate of production in terms of 50° acid will be obtained by increasing these figures by 50 per cent.

A portion of the Canadian production has been exported, but the import and export of sulphuric acid appears to have varied greatly from year to year. In 1913, 1914, 1915, and 1917, the exports considerably exceeded the imports, whereas in 1916 the imports were much in excess. The total exports of sulphuric acid in 1917 were 9,478 tons, valued at \$197,888, as against exports in 1916 of 1,576 tons, valued at \$74,527. The imports of sulphuric acid during the calendar year 1917 were 216 tons, valued at \$15,680, as compared with imports in 1916 of 2,403 tons, valued at \$115,173.

¹ Sulphuric Acid, Manufacturing Chemists Association of the United States.

Annual Exports of Sulphuric Acid.

Calendar Year.	Short tons.	Value.	Average value per ton.
1913.....	1,247	\$ 15,295	\$ 12.27
1914.....	3,743	45,612	12.19
1915.....	9,635	243,457	25.27
1916.....	1,576	74,527	47.29
1917.....	9,478	197,888	20.88

Imports of Sulphuric Acid.

Calendar Year.	Pounds.	Value.	Calendar Year.	Pounds.	Value.
1910.....	2,474,802	\$ 21,702	1914.....	332,274	\$ 7,149
1911.....	1,031,803	9,281	1915.....	281,413	4,872
1912.....	4,971,446	35,325	1916.....	4,806,304	115,173
1913.....	145,074	4,054	1917.....	432,061	15,680

The following is a list of manufacturers of sulphuric acid in Canada:—

Dominion Iron and Steel Co., Ltd., Sydney, C.B.

Consolidated Mining and Smelting Co., Trail, B.C.

Algoma Steel Corporation, Ltd., Sault Ste. Marie, Ont.

Grasselli Chemical Co., Ltd., Hamilton, Ont.

Nichols Chemical Co. of Canada, Ltd., Montreal, Que. Acid plants at:
Capelton, Que.; Sulphide, Ont.; Barnet, B.C.

Victoria Chemical Co., Ltd., Victoria, B.C.

British Chemical Co., Trenton, Ont.

Ætna Chemical Co. of Canada, Ltd., Drummondville, Que.

QUARTZ (Silica).

The statistics of quartz, or silica production given in the tabulated statement here-with include chiefly the quartz or quartzite used in the smelting of nickel and copper ores, in the manufacture of ferro-silicon and in the manufacture of sanitary ware, or earthenware. Production of silica in the form of infusorial earth has already been included under tripolite and a small production of silica in the form of crushed sand-stone used in the manufacture of glass and for foundry work in steel plants is included in the statistics of sandstone production.

The total shipments of quartz, or quartzite in 1917 were 216,288 tons valued at \$496,182 compared with shipments in 1916 of 136,288 tons valued at \$251,226.

Imports of silex, a finely ground quartz, in 1917 were 851 tons valued at \$12,812, and the imports of flint were 3,774 tons valued at \$64,292.

Annual Production of Quartz.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
1890.....	200	\$ 1,000	1900-1905.....			1912.....	100,242	\$195,216
1891-2.....			1906.....	48,376	\$ 65,765	1913.....	78,261	169,842
1893.....	100	500	1907.....	56,585	124,148	1914.....	54,148	84,583
1894-5-6.....	10	50	1908.....	44,741	52,830	1915.....	127,108	205,153
1897.....			1909.....	56,924	71,285	1916.....	136,745	251,226
1898.....	284	570	1910.....	88,205	91,951	1917.....	216,288	496,182
1899.....	600	1,260	1911.....	60,526	83,865			

Imports of Silex: Crystallized Quartz.

Calendar Year.	Cwt.	Value.	Calendar Year.	Cwt.	Value.	Calendar Year.	Cwt.	Value.
1910.....	12,577	\$11,996	1913.....	13,797	\$13,811	1916 (Duty free).....	33,540	\$18,297
1911.....	7,877	7,518	1914.....	17,407	15,502	1917.....	17,018	12,812
1912.....	12,571	10,680	1915.....	8,036	5,527			

The following brief summary of the uses of silica has been compiled by Mr. J. Keele, Chief Engineer of the Ceramic Division of the Mines Branch.

Uses of Silica.

Rocks such as quartz, quartzite, sandstone, flint, and diatomaceous earth are the source of the silica used in various industries. The preparation of these raw materials for industrial purposes consists in crushing, grinding and washing according to the use for which it is required.

The following are some of the uses of this material:—

Glass manufacture.—Sand is the principal constituent of all glass comprising from 52 to 65 per cent of the mass of the original mixture. Whiteness and brilliance is essential in the finest glassware, hence only the purest quartz sand can be employed

in its manufacture. Absolute purity is not essential in sand which is used for plate and window glass, but not more than 0.2 per cent of iron oxide is permissible. Rough glassware, such as skylights, insulators, bottles and jars which have greenish or amber colours may be made from the more impure sands containing as much as .05 per cent of iron oxide.

The suitability of sand for glass making may be determined roughly by inspecting it for the following properties: The sand should consist almost entirely of quartz or silica (most glass sands contain from 98 to more than 99 per cent of silica). The texture of the sand should be such that the grains should not be larger than 20 mesh, or smaller than 80 mesh. The best sand is white, or one that can be easily washed white, but for bottles and jars the sand may be flesh coloured or drab, due to a coating of clay on the sand grains.

Most of the glass sand used in America is obtained by washing soft crumbly sandstone, but where power is very cheap it is practicable to produce glass sand by crushing quartzite and vein quartz. The ground product requires to be washed and scoured before it is ready for use.

Glass sand for bottle making is produced at two points in Canada, at Melocheville, Que., and Nelles Corners, Ont., but the finest grades of sand are imported from Pennsylvania and Illinois in the United States.

Paint manufacture.—Manufacturers of paint use considerable quantities of very finely ground silica which forms as much as one-third of the total pigment in some paints. For this purpose finely ground crystalline material such as vein quartz, or quartz from pegmatite dykes is preferred because on crushing they yield angular grains which adhere more firmly to the article painted. This product is prepared in the United States.

Pottery manufacture.—In the pottery industry silica is generally called flint, and is used to diminish shrinkage and to give rigidity to the ware when burned at high temperatures. For this purpose the silica is ground to pass a 120 or 150 mesh screen and must not contain more than 0.5 per cent of iron bearing minerals. All white pottery ware such as table ware, sanitary porcelain, wall and floor tile, electric porcelain, etc., contains silica in addition to clay and feldspar. The glazes and enamels applied to the surface not only of pottery bodies but also of enamelled ironware, contains silica as one of the ingredients.

Silica for potters use is not prepared in Canada at present.

Soaps and polishing powders.—Ground quartz is preferred to fine ground natural sand for these purposes on account of the whiteness and angularity of the grain. Diatomaceous earth is also used as a polishing powder.

Silex.—This is a trade name for a very finely ground quartz. Most of the silica imported into Canada for various uses comes in this form.

Fire sand.—Is a highly refractory silica sand used for lining and patching reverberatory and other furnaces, cupolas and ladles used to contain molten metal. It is also used for making runners for pig-iron casting.

Silica brick.—Silica brick are made from quartzite which is crushed to the proper size particles, bonded with about two per cent of lime and moulded into brick shapes. These when dry are burned in kilns to a temperature of 2,600 degrees Fahr., or thereabouts. These bricks have a wide use in metallurgical processes and in by-product coke ovens.

Silica brick are made in Canada at Sault Ste. Marie, and Waterdown, Ont., and at Sydney, N.S. A large plant for their manufacture is now in course of erection at Whycocomagh, N.S., to use the quartzite from Skye mountain in that vicinity.

Carborundum and electro metals.—Pure quartz sand is mixed with certain proportions of ground coke, salt and sawdust and fused in the electric furnace in the manufacture of carborundum. Quartzite crushed to about the size of road metal and mixed with iron oxide is fused in the electric furnace to produce ferro-silicon, a material which is extensively used in the production of steel.

Insulating material.—On account of its peculiar physical structure, diatomaceous earth forms a valuable material for the conservation of heat in furnaces. It is either packed in loose or made up in the form of bricks, or blocks, and built into the walls of the furnace as a filler. Diatomaceous earth occurs in large deposits in British Columbia and in Nova Scotia.

References to silica rocks in Canada and their products:—

“Non-Metallic Minerals”, by H. Fréchette, Mines Branch, Ottawa, pp. 76-91.

This report gives the prices obtained in Canada previous to 1914 for the various forms of silica used in the industries, also an account of the preparation and uses of the material.

“Summary Report”, Mines Branch, 1917, pp. 51-52 and 119-120. This report gives the occurrence of certain deposits of sandstone in Ontario and Quebec which may be suitable for pottery, or foundry uses.

SALT.

The production of salt in Canada has been almost altogether obtained from salt fields in southwestern Ontario, although there was at one time a very small production in New Brunswick and Manitoba.

The total sales of salt in 1917 (including the salt equivalent of brine used in the chemical industries) were 138,909 tons valued at \$1,047,792 exclusive of the value of the packages. The average number of men employed during the year was 309 and wages paid \$249,073. The value of the packages used during the year was \$403,879 and stocks of salt in manufacturers' hands at the close of the year were reported as 2,024 tons. The 1917 sales included table and dairy salt 34,252 tons; common fine 65,117 tons; common coarse 37,398 tons, and land salt 2,142 tons.

The sales of salt in 1916 were 132,903 tons valued at \$717,653 and included table and dairy salt 35,045 tons; common fine 54,596 tons; common coarse 41,259 tons and land salt 2,003 tons.

Detailed Statistics of Salt Production 1912-1917.

		1912.	1913.	1914.	1915.	1916.	1917.
Sales of salt.....	Tons.	95,053	100,791	107,038	119,900	132,903	138,909
Value of salt (exclusive of packages).....	\$	459,582	491,280	493,648	600,226	717,653	1,047,792
Value of packages.....	\$	224,696	262,479	278,879	280,747	309,603	403,879
Stock in manufacturers' hands at end of year.....	Tons.	3,256	4,066	4,519	3,613	1,970	2,024
Men employed.....	No.	231	251	253	254	262	309
Wages paid.....	\$	155,648	178,386	178,277	186,059	219,595	249,073

Annual Shipments of Salt.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value	Calendar Year.	Tons.	Value.
1886.....	62,359	\$227,195	1897.....	51,348	\$225,730	1908.....	79,975	\$ 378,798
1887.....	60,173	166,394	1898.....	57,142	248,639	1909.....	84,037	415,219
1888.....	59,070	185,460	1899.....	59,339	254,390	1910.....	84,092	409,624
1889.....	32,832	129,547	1900.....	62,055	279,458	1911.....	91,532	443,004
1890.....	43,754	198,857	1901.....	59,428	262,328	1912.....	95,053	459,582
1891.....	45,021	161,179	1902.....	64,456	292,581	1913.....	100,791	491,280
1892.....	45,486	162,041	1903.....	62,452	297,517	1914.....	107,038	493,648
1893.....	62,324	195,926	1904.....	69,477	321,778	1915.....	119,900	600,226
1894.....	57,199	170,687	1905.....	67,340	320,858	1916.....	132,903	717,653
1895.....	52,376	160,455	1906.....	76,720	329,130	1917.....	138,909	1,047,792
1896.....	43,960	169,693	1907.....	72,697	342,315			

Exports.—For many years the export of salt had been very small, from 200 to 300 tons per annum, but in 1917 the exports were increased to 8,643 tons valued at \$94,364, as compared with exports in 1916 of 153 tons valued at \$2,223.

Exports of Salt.

Calendar Year.	Pounds.	Value.	Calendar Year.	Pounds.	Value.
1906.....	618,707	\$ 3,437	1912.....	289,150	\$ 3,723
1907.....	2,222,542	7,709	1913.....	460,900	3,047
1908.....	529,229	3,840	1914.....	952,700	5,229
1909.....	276,765	2,488	1915.....	889,300	5,836
1910.....	275,200	2,618	1916.....	305,900	2,223
1911.....	454,600	5,055	1917.....	17,285,000	94,364

Imports.—The imports of salt have for many years been larger in quantity and almost as great in value as the domestic production. During the calendar year 1917 the imports of salt subject to duty included: salt in bulk 44,973 tons valued at \$184,792, and salt in bags, barrels, or other packages 12,293 tons valued at \$120,665. Salt imported from the United Kingdom, or any British possession, or imported for the use of sea or gulf fisheries, duty free, was imported to the extent of 113,545 tons valued at \$782,748, giving total imports of 170,810 tons valued at \$1,088,205.

Imports of Salt paying Duty, 1910-1917.

Calendar Year.	Salt, fine, in bulk, n.e.s. (a)		Salt, n.e.s., in bags, barrels or other packages. (b)		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1910.....	24,275,700	\$ 41,703	10,954,300	\$ 41,340	35,230,000	\$ 83,043
1911.....	27,970,500	45,178	11,280,800	49,283	39,251,300	94,461
1912.....	35,436,700	55,089	14,601,600	61,008	50,038,300	116,097
1913.....	45,574,800	73,115	17,440,200	74,660	63,015,000	147,775
1914.....	52,131,100	82,149	15,655,500	68,959	67,786,600	151,108
1915.....	55,226,400	84,449	13,734,800	50,997	68,961,200	135,446
1916.....	68,070,200	111,130	15,358,900	59,980	83,429,100	171,110
1917.....	89,945,600	184,792	24,585,400	120,665	114,531,000	305,457

(a) Duty 5c. per 100 lb. (b) Duty 7½c. per 100 lb.

Imports: Salt Not Paying Duty.*

Calendar Year.	Pounds.	Value.	Calendar Year.	Pounds.	Value.
		\$			\$
1910.....	217,587,000	364,735	1914.....	217,505,500	389,773
1911.....	202,347,100	326,325	1915.....	206,011,600	382,080
1912.....	219,278,900	352,081	1916.....	218,986,700	523,725
1913.....	225,877,200	417,508	1917.....	227,089,900	782,748

* Salt imported from the United Kingdom, or any British possession, or imported for the use of the sea or gulf fisheries.

The total consumption of salt in 1917 was 301,077 tons valued at \$2,041,633 as compared with 283,958 tons valued at \$1,410,265 in 1916; 256,942 tons valued at \$1,111,916 in 1915, and 249,208 tons valued at \$1,029,300 in 1914.

Consumption of Salt in Canada in 1916 and 1917.

	1916.		1917.	
	Pounds.	Value.	Pounds.	Value.
Canadian salt production.....	265,806,000	\$ 717,653	277,818,000	\$ 1,047,792
Less exports.....	305,900	2,223	17,285,000	94,364
	265,500,100	715,430	260,533,000	953,428
Imports of salt paying duty	83,429,100	171,110	114,531,000	305,457
Imports of salt free of duty.....	218,986,700	523,725	227,089,000	782,748
Total.....	567,915,900	1,410,265	602,153,000	2,041,633

The manufacture of caustic soda and chloride of lime has been carried on at Sandwich since 1911 by the Canadian Salt Company and a second plant for the manufacture of soda products is under construction at Amherstburg by the Brunner Mond Canada, Limited.

The annual imports of caustic soda and chloride of lime since 1910 are shown in the accompanying table:—

Imports of Caustic Soda and Chloride of Lime.

	Caustic Soda.		Chloride of Lime.	
	Pounds.	Value.	Pounds.	Value.
1910.....	13,974,444	\$ 267,338	10,386,519	\$ 116,923
1911.....	13,812,053	259,982	11,725,167	118,501
1912.....	14,544,545	278,579	12,183,765	113,346
1913.....	15,983,298	291,008	12,761,153	115,614
1914.....	18,436,827	314,278	15,147,645	138,619
1915.....	7,737,149	184,468	12,015,999	112,142
1916.....	12,502,758	508,860	7,892,923	158,546
1917.....	13,694,560	643,178	7,719,919	100,834

TALC.

The total shipments of crude and ground talc by mine operators during 1917 was 15,803 tons valued at \$76,539 as compared with shipments in 1916 of 13,104 tons valued at \$49,423, and shipments in 1915 of 11,885 tons valued at \$40,554. A considerable portion of the shipments of crude mineral included above is ground at Madoc and the total shipments of ground talc during 1917 were 13,678 tons of varying grades but an average value of about \$13 per ton. Crude talc sold at from \$4 to \$8 per ton.

The operators were:—

Messrs. Cross & Wellington, Madoc, operating the Henderson mine on lot 14, concession XIV, Huntingdon township, Hastings county, Ont.

Anglo-American Talc Corporation, Ltd., Madoc, operating the Connolly mine on W. half of lot 15, concession XIV, Huntingdon township, Hastings county, Ont.

The Henderson mine has been operated for some years, the greater part of the output being sold to Geo. H. Gillespie & Co. who operate a grinding mill at Madoc, the balance being exported to United States.

Annual Production of Soapstone and Talc.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
1886.....	50	\$ 400	1897.....	157	\$ 350	1908.....	1,016	\$ 3,048
1887.....	100	800	1898.....	405	1,000	1909.....	4,350	10,300
1888.....	140	280	1899.....	450	1,960	1910.....	7,112	22,308
1889.....	195	1,170	1900.....	1,420	6,365	1911.....	7,300	22,100
1890.....	917	1,239	1901.....	259	842	1912.....	8,270	23,132
1891.....	Nil.	Nil.	1902.....	689	1,804	1913.....	12,250	45,980
1892.....	1,374	6,240	1903.....	990	2,739	1914.....	10,808	40,418
1893.....	717	1,920	1904.....	840	1,875	1915.....	11,885	40,554
1894.....	916	1,640	1905.....	500	1,800	1916.....	13,104	49,423
1895.....	475	2,138	1906.....	1,234	3,030	1917.....	15,803	76,539
1896.....	410	1,230	1907.....	1,534	4,602			

Exports of talc for the nine months ending December 31, 1917, were valued at \$131,637, the quantity not being recorded.

Imports of talc in 1915 were 154 tons valued at \$1,866 as against imports of 584 tons valued at \$8,983 in 1914 and 402 tons valued at \$10,706 in 1913. Imports have not been separately recorded since 1915.

STRUCTURAL MATERIALS AND CLAY PRODUCTS

INTRODUCTORY.

The subjects included under this heading comprise, in the order treated: cement, clay products of various kinds, such as brick, sewerpipe and tile, pottery, etc., lime, sand-lime brick, sand and gravel, slate, and stone for building and other purposes; including granite, marble, limestone, sandstone, etc. The statistics of stone production do not include the stone used in making cement or lime, but are as complete as possible for all other established stone quarries; nevertheless there is undoubtedly a large production of stone for foundation work, road-making, and railway construction, of which no record is available.

The total value of the production of these structural products in 1917 was \$19,837,311, as compared with \$17,467,186 in 1916, and \$17,920,759 in 1915, the increase in 1917 being \$2,370,125, or 13.6 per cent, as compared with the previous year.

The total value of imports of the same class of products in 1917 was \$7,901,398, as against \$5,562,220 in 1916, and \$3,912,946 in 1915.

The total exports were valued at \$647,369 in 1917, as against \$681,239 in 1916, and \$519,676 in 1915.

The apparent total consumption of these structural products based upon the record of production, imports and exports, was in 1917 valued at \$27,091,340, as compared with \$22,348,167 in 1916, and \$21,314,029 in 1915, the increase in value of consumption in 1917 being \$4,743,187.

A summary of the production, imports, exports and consumption of structural materials and clay products in 1917 and 1916, and the annual production from 1910 to 1915, are shown in tables herewith:—

Structural Materials, Calendar Year, 1917.

	Production.	Imports.	Exports.	Consumption.
	\$	\$	\$	\$
Cement, portland.....	7,724,246	28,356	16,857	7,735,745
Clay products.....	4,779,038	6,610,837	138,143	11,251,732
Lime.....	1,558,487	78,251	74,523	1,562,215
Sand-lime brick.....	201,355	.....	.....	201,355
Sand and gravel.....	2,326,249	312,403	290,964	2,347,688
Slate.....	7,789	106,893	.....	114,682
Stone.....	3,240,147	764,658	126,882	3,877,923
	19,837,311	7,901,398	647,369	27,091,340

Structural Materials, Calendar Year, 1916.

—	Production.	Imports.	Exports.	Consumption.
	\$	\$	\$	\$
Cement, portland.....	6,547,728	43,747	2,424	6,589,051
Clay products.....	4,120,805	4,554,167	80,112	8,594,860
Lime.....	1,091,463	96,332	66,406	1,121,389
Sand-lime brick.....	126,235			126,235
Sand and gravel.....	1,838,320	183,894	388,309	1,633,905
Slate.....	6,223	96,776		102,999
Stone.....	3,736,412	587,304	143,988	4,179,728
	17,467,186	5,562,220	681,239	22,348,167

Production of Structural Materials, 1910-1915.

—	1910.	1911.	1912.	1913.	1914.	1915.
	\$	\$	\$	\$	\$	\$
Cement.....	6,412,215	7,644,537	9,016,556	11,019,418	9,187,924	6,977,024
Clay products.....	7,629,956	8,359,933	10,575,869	9,504,314	6,871,957	3,914,488
Lime.....	1,137,079	1,517,599	1,844,849	1,609,398	1,360,628	1,015,702
Sand-lime brick.....	371,857	442,427	1,020,386	906,665	609,515	141,742
Sand and gravel.....	(a) 407,974	(a) 408,110	1,512,099	2,258,874	2,505,310	1,624,767
Slate.....	18,492	8,248	8,939	6,444	4,837	2,039
Stone.....	3,650,019	4,328,757	4,726,171	5,504,639	5,469,056	4,244,997
Total.....	19,627,592	22,709,611	28,794,869	30,809,752	26,009,227	17,920,759

(a) Exports only.

CEMENT.

The total quantity of cement made in 1917 according to returns received from manufacturers was 4,987,255 barrels of 350 pounds net each (872,769 tons), as compared with 4,753,033 barrels (831,781 tons) made in 1916, an increase of 134,222 barrels (23,489 tons) or nearly 3 per cent.

The total quantity of Canadian portland cement sold in 1917, was 4,768,488 barrels (834,485 tons) as compared with 5,369,560 barrels (939,671 tons) sold in 1916, a decrease of 601,072 barrels (105,188 tons), or 11.2 per cent.

The total consumption of cement in 1917 including Canadian and imported cement was 4,777,068 barrels of 350 pounds each (835,987 tons) as compared with 5,390,156 barrels (943,252 tons) in 1916, a decrease of 613,088 barrels (107,290 tons), or 11.4 per cent.

The production of cement in Canada since 1909 though all classed as portland, has included an output of puzzolan cement, made from blast furnace slag at Sydney, N.S., and a small production of "natural portland," made at Babcock, Manitoba. The slag cement plant at Sydney has, however, been idle during the past three years.

The average number of men employed in Canadian cement plants during 1917 was 1,396, and total wages paid \$1,424,215. In 1916 the average number of men employed was 1,695 and wages paid \$1,307,224.

The production of cement in 1917 was derived from nine plants; seventeen other plants were idle throughout the year. The total capacity of the twenty-six completed plants is reported as 50,230 barrels the details of which are shown by provinces in the following table. As compared with 1916 the total number of plants shows a decrease of three, two plants having been reported as dismantled and a third abandoned.

Daily Capacity of Completed Plants, 1916, and 1917.

	1916.						1917.					
	Active.		Idle.		Total.		Active.		Idle.		Total.	
	No.	Cap- acity.	No.	Cap- acity.	No.	Cap- acity.	No.	Cap- acity.	No.	Cap- acity.	No.	Cap- acity.
Nova Scotia.....			1	140	1	140			1	140	1	140
Quebec.....	2	14,800	1	1,800	3	16,600	1	12,000	2	4,600	3	16,600
Ontario.....	7	10,950	9	8,900	16	19,850	5	9,700	9	8,150	14	17,850
Manitoba.....	2	3,725			2	3,725	2	3,640			2	3,640
Alberta.....	2	4,000	2	3,500	4	7,500			4	7,000	4	7,000
British Columbia.....	2	5,000	1	600	3	5,600	1	3,000	1	2,000	2	5,000
	15	38,475	14	14,940	29	53,415	9	28,340	17	21,890	26	50,230

The completed plants are distributed as follows: One in Nova Scotia using blast furnace slag; three in Quebec using limestone and clay; fourteen in Ontario of which eight use marl and six limestone; two rock plants in Manitoba, one of which makes a natural portland; four in Alberta, all limestone plants; and two limestone plants in British Columbia.

Statistics of the annual sales of natural rock and portland cement since 1887 are shown in the following table:—

Annual Production* of Cement.

Calendar Year.	Natural Rock Cement.			Portland Cement.			Total.	
	Barrels.	Value.	Average value.	Barrels.	Value.	Average value.	Barrels.	Value.
	\$	\$	cts.	\$	\$	cts.	\$	
1887.							69,843	81,909
1888.							50,668	35,593
1889.	90,474	69,790	0 77	Nil.	Nil.		90,474	69,790
1890.	87,521	74,822	0 85	14,695	17,583	1 20	102,216	92,405
1891.	90,846	103,479	1 14	2,633	5,082	1 93	93,479	108,561
1892.	88,187	94,912	1 08	29,221	52,751	1 81	117,408	147,663
1893.	126,673	130,167	1 03	31,924	63,848	2 00	158,597	194,015
1894.	72,965	74,842	1 03	35,177	69,795	1 98	108,142	144,637
1895.	66,219	60,795	0 92	62,075	112,880	1 82	128,294	173,675
1896.	70,705	60,500	0 86	78,385	141,151	1 80	149,090	201,651
1897.	85,450	65,893	0 77	119,763	209,380	1 75	205,213	275,273
1898.	87,125	73,412	0 84	163,084	324,168	1 99	250,209	397,580
1899.	147,387	119,308	0 81	255,366	513,983	2 01	396,753	633,291
1900.	125,428	99,994	0 80	292,124	562,916	1 93	417,552	662,910
1901.	133,328	94,415	0 71	317,066	565,615	1 78	450,394	660,030
1902.	127,931	98,932	0 77	594,594	1,028,618	1 73	722,525	1,127,550
1903.	92,252	74,665	0 81	627,741	1,150,592	1 83	719,993	1,225,247
1904.	56,814	50,247	0 88	910,358	1,287,992	1 41	967,172	1,338,239
1905.	14,184	10,274	0 72	1,346,548	1,913,740	1 42	1,360,732	1,924,014
1906.	8,610	6,052	0 70	2,119,764	3,164,807	1 49	2,128,374	3,170,859
1907.	5,775	4,043	0 70	2,436,903	3,777,328	1 55	2,441,868	3,781,371
1908.	1,044	815	0 78	2,665,289	3,709,139	1 39	2,666,333	3,709,954
1909.	0	0		4,067,709	5,345,802	1 31	4,067,709	5,345,802
1910.	0	0		4,753,975	6,412,215	1 35	4,753,975	6,412,215
1911.	0	0		5,692,915	7,644,537	1 34	5,692,915	7,644,537
1912.	0	0		7,132,732	9,106,556	1 28	7,132,732	9,106,556
1913.	0	0		8,658,805	11,019,418	1 27	8,658,805	11,019,418
1914.	0	0		7,172,480	9,187,924	1 28	7,172,480	9,187,924
1915.	0	0		5,681,032	6,977,024	1 23	5,681,032	6,977,024
1916.				5,369,560	6,547,728	1 22	5,369,560	6,547,728
1917.				4,768,488	7,724,246	1 62	4,768,488	7,724,246

*Quantities sold or used.

A comparison of the principal statistics of 1917 and 1916 showing the increase, or decrease as the case may be, is given below.

In 1916 the sales exceeded the output, whereas in 1917 the quantity made was greater than that sold, resulting in an increased stock of cement on hand at the end of 1917.

Comparison of Production, Sales and Imports of Portland Cement in 1916, and 1917.

—	1916.	1917.	Increase.	Per cent.	Decrease.	Per cent.
<hr/>						
Cement sold or used. Bls.	5,369,560	4,768,488			601,072	11.2
Cement manufactured. "	4,753,033	4,987,255	134,222	2.8		
Stock on hand Jan. 1. "	2,072,266	1,441,609			630,657	30.4
Stock on hand Dec. 31. "	1,444,875	1,660,405	215,530	14.9		
<hr/>						
Value of cement sold or used . . . \$	6,547,728	7,724,246	1,176,518	17.9		
Average price per barrel. "	1.22	1.62	40	32.8		
Wages paid. "	1,307,224	1,424,215	116,991	8.9		
Men employed. No.	1,695	1,396			299	17.6
<hr/>						
Imports of portland cement. . . . Bls.	20,596	8,580			12,016	58.3
Value of cement. \$	31,621	19,646			11,975	37.9
Average price per barrel. "	1.54	2.29	0.75	48.7		
<hr/>						
Total consumption of cement in Canada. Bls.	5,390,156	4,777,068			613,088	11.4

Of the total cement made in 1917, 96,755 barrels were made from marl and 4,890,500 barrels from limestone. In 1911, 28 per cent of the total quantity of cement made was produced from marl, but the production from this source has fallen off so rapidly that in 1917 less than 2 per cent of the total was obtained from this source.

The proportion of cement made from marl and limestone since 1911 is shown in the following table:—

Cement made from Marl and from Limestone.

Year.	Cement from Marl.		Cement from Limestone.	
	Barrels.	Per cent	Barrels.	Per cent
1911.....	1,626,857	28.0	*4,050,682	72.0
1912.....	1,420,155	20.0	*5,720,849	80.0
1913.....	1,491,131	16.8	*7,395,202	83.2
1914.....	641,869	7.3	*8,085,400	92.7
1915.....	429,268	8.3	4,724,495	91.7
1916.....	164,436	3.4	4,588,597	96.6
1917.....	96,755	1.9	4,890,500	98.1

*Includes slag cement.

Statistics of the annual production of portland cement since 1897, showing the quantity made, quantity sold, stocks on hand at the end of the year, value of sales, etc., are shown in the next table.

Annual Production of Portland Cement.

(BARRELS.)

Year.	Number of operating plants.	Quantity made.	Quantity sold.	On hand Dec. 31.	Value of sales.	Average per barrel.	Daily capacity operating plants.
					\$	\$	
1897.....			119,763		209,380	1.75	
1898.....			163,084		324,168	1.99	
1899.....			225,366		513,983	2.01	
1900.....			292,124		562,916	1.91	
1901.....	4	360,160	317,066	58,094	565,615	1.78	
1902.....	8	562,335	594,594	33,446	1,028,618	1.73	3,900
1903.....	9	714,136	627,741	128,886	1,150,592	1.83	4,850
1904.....	10	908,990	910,358	112,051	1,287,992	1.41	
1905.....	13	1,541,568	1,346,548	306,466	1,913,740	1.42	8,000
1906.....	15	2,152,562	2,119,764	302,356	3,164,807	1.49	10,500
1907.....	17	2,491,513	2,436,693	354,435	3,777,328	1.55	14,400
1908.....	23	3,495,961	2,665,289	1,214,021	3,709,139	1.39	27,500
1909.....	22	4,146,708	4,067,709	1,777,238	5,345,802	1.31	23,050
1910.....	22	4,396,282	4,753,975	832,038	6,412,215	1.35	25,835
1911.....	24	5,677,539	5,692,915	903,589	7,644,537	1.34	28,810
1912.....	24	7,141,004	7,132,732	903,094	9,106,556	1.28	36,515
1913.....	27	8,886,333	8,658,805	1,089,595	11,019,418	1.27	50,540
1914.....	24	8,727,269	7,172,480	2,628,117	9,187,924	1.28	48,815
1915.....	17	5,153,763	5,681,032	2,062,961	6,977,024	1.23	41,850
1916.....	15	4,753,033	5,369,560	1,444,875	6,547,728	1.22	38,475
1917.....	9	4,987,255	4,768,488	1,441,609	7,724,246	1.62	28,340

Imports and Exports.—The quantity of cement exported is not recorded, but the total value of exports in 1917 is reported as \$16,857, as against a value of exports in 1916 of \$2,424, and \$5,161 in 1915.

The imports of cement previous to 1901 were larger than the Canadian production, but gave way steadily to the increasing domestic output until 1909, during which year the imports amounted to 142,194 barrels, or about 3 per cent of the Canadian consumption. From 1910 to 1912, inclusive, there was a steady increase in the importation of cement, the imports in 1912 being 1,434,413 barrels. During four and one-half months of 1912 the duty was, on account of the scarcity in western Canada, reduced by one-half, and on May 31, 1913, a permanent reduction was made in the general tariff from 12½ cents to 10 cents per hundred pounds. The imports, however, have fallen to 254,093 barrels in 1913, 98,022 barrels in 1914, 28,190 barrels in 1915, 20,596 barrels in 1916, and 8,580 barrels in 1917.

The United States has been the principal source of imports during the past few years, supplying all imports in 1916 and over 96 per cent of the 1915 imports. During the latter year about 4 per cent was derived from Great Britain. In 1914 about 71 per cent, and in 1913, 68 per cent of the imports were from the United States. The source of imports during 1917 has not been separately published.

Statistics of the exports of cement since 1906 and of the imports since 1907 are given in the next two tables:—

Exports of Cement.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	\$		\$		\$		\$
1906.....	7,551	1909.....	113,362	1912.....	2,436	1915.....	5,161
1907.....	9,618	1910.....	12,914	1913.....	1,736	1916.....	2,424
1908.....	34,591	1911.....	4,067	1914.....	2,223	1917.....	16,857

Imports of Cement.

Calendar Year.	Cement and Mfrs. of N.E.S.*	Hydraulic Cement.†			Portland Cement.		
		Quantity.	Value.	Average Value.	Quantity.	Value.	Average Value.
		Cwt.	\$	\$	Cwt.	\$	\$
1907.....	13,748	16,788	6,339	0.38	2,354,204	837,520	0.36
1908.....	5,843	2,752	921	0.33	1,641,672	531,045	0.32
1909.....	6,374	682	614	0.90	497,678	166,669	0.33
1910.....	7,718	365	349	0.96	1,222,586	468,046	0.38
1911.....	7,430	26,655	6,107	0.23	2,316,707	834,879	0.36
1912.....	9,698	†			5,020,446	1,969,529	0.39
1913.....	17,729	†			889,324	409,303	0.46
1914.....	12,533	†			343,076	147,158	0.43
1915.....	7,410	†			98,664	40,426	0.41
1916.....	12,126	†			72,087	31,621	0.44
1917.....	8,710				30,031	19,616	0.65

* Cement not elsewhere specified and manufactures of cement.

† From 1912 included in portland cement.

Consumption of Cement.—The consumption of cement is represented practically by the domestic production, together with the imports, the exports having been hitherto apparently small and practically negligible, although considerably greater in 1917 than in the immediately preceding years. The total consumption of cement in Canada in 1917 was 4,777,068 barrels (835,987 tons), made up of 4,768,488 barrels (834,485 tons) of Canadian cement and 8,580 barrels (1,502 tons) of imported cement, the Canadian cement representing 99.8 per cent and the imported cement 0.2 per cent of the total.

In 1916 the total consumption of cement was 5,390,156 barrels (943,277 tons), made up of 5,369,560 barrels (939,673 tons), of Canadian cement, and 20,596 barrels

(3,604 tons) of imported cement, the Canadian cement representing 99.6 per cent and the imported cement 0.4 per cent of the total.

Annual Consumption of Portland Cement.

Calendar Year.	Canadian.		Imported.		Total.
	Barrels.	Per cent.	Barrels.	Per cent.	Barrels.
1901.....	317,066	36	555,900	64	872,966
1902.....	594,594	52	544,954	48	1,139,548
1903.....	627,741	45	773,678	55	1,401,419
1904.....	910,358	54	784,630	46	1,694,988
1905.....	1,346,548	59	918,701	41	2,265,249
1906.....	2,119,764	76	665,845	24	2,785,609
1907.....	2,436,093	78	672,630	22	3,108,723
1908.....	2,665,289	85	469,049	15	3,134,338
1909.....	4,067,709	97	142,194	3	4,209,903
1910.....	4,753,975	93	349,310	7	5,103,285
1911.....	5,692,915	90	661,916	10	6,354,831
1912.....	7,132,732	83.3	1,434,413	16.7	8,567,145
1913.....	8,658,805	97.1	254,093	2.9	8,912,898
1914.....	7,172,480	98.7	98,022	1.3	7,270,502
1915.....	5,681,032	99.5	28,190	0.5	5,709,222
1916.....	5,369,560	99.7	20,596	0.4	5,390,156
1917.....	4,768,488	99.8	8,580	0.2	4,777,068

Nova Scotia.—There is but one cement plant in Nova Scotia, located at Sydney and operated by the Sydney Cement Company, Limited. Puzzolan cement is made from blast furnace slag and lime. This plant has not been operated for three years.

Quebec.—This Province has three completed cement mills, all operated by the Canada Cement Company, Limited; two situated near Montreal, one at Longue Pointe which has been idle throughout the year, in so far as cement making is concerned, though the plant has been used for the calcining of magnesite, the other at Montreal East, and the third plant at Hull. The Hull plant has also been used during 1917 calcining magnesite. The Montreal mills have now a combined daily capacity of 13,800 barrels and the Hull mill 2,800 barrels. The total quantity of cement sold or used by producers during 1917 in this Province was 2,079,625 barrels, valued at \$3,274,989, as compared with 2,150,475 barrels, valued at \$2,525,863 in 1916. Two additional cement plants are being completed in this Province, one at Neuville, the other at Point aux Trembles.

Ontario.—Ontario continues as the most important cement producing province in Canada, having now fourteen completed plants, with a total daily capacity of 17,850 barrels at the end of 1917.

The total sales of cement in Ontario during 1917 were 1,676,904 barrels, valued at \$2,267,610 as compared with 2,230,386 barrels, valued at \$2,312,677 in 1916.

The detailed statistics of production during 1916 and 1917 are shown in the next table.

Cement Production in Ontario, 1916, and 1917.

	1916.	1917.	Increase.	Per cent.	Decrease.	Per cent.
Cement sold or used. Bls.	2,230,386	1,676,904			553,482	24.8
Cement manufactured. "	1,858,693	1,865,785	7,092	0.4		
Stock on hand Jan. 1. "	753,301	378,365			374,936	49.8
Stock on hand Dec. 31. "	381,608	567,260	185,652	48.7		
Value of cement sold. \$	2,312,677	2,267,610			45,067	1.96
Wages paid. "	490,126	562,206	72,080	14.7		
Men employed No.	722	599			123	17.0
Total daily capacity of operating plants Bls.	10,950	9,700			1,250	11.4

Manitoba.—The Commercial Cement Company of Winnipeg is operating a natural portland cement plant at Babcock, 75 miles southwest of Winnipeg, on the Canadian Northern railway. The capacity of the plant is reported as about 225 barrels per day. The mill of the Canada Cement Company near Winnipeg, at Tuxedo, has a daily capacity of 3,500 barrels. Limestone is obtained from a property in township 28, range 10, west of the first meridian, about 130 miles north of Winnipeg, on the Oak Point branch of the Canadian Northern railway.

Alberta.—This province possesses four completed cement plants with a total daily capacity of about 7,000 barrels, located respectively at Exshaw, Calgary, Blairmore, and Marlboro. These are now all limestone plants, the last named having been remodelled during 1916 and changed from marl to rock.

In addition to the completed plants, there are two other rock plants on which construction work has been suspended, viz.: One at Blairmore owned by the Keystone Portland Cement Company, and one at Dauntless, near Medicine Hat, owned by the Canada Cement Company; the latter plant is being planned for a capacity of 1,000,000 barrels per annum.

The total quantity of cement marketed by producers in 1917 was 259,423 barrels, valued at \$567,969, as against 275,727 barrels, valued at \$477,832 in 1916.

British Columbia.—The cement plant at Princeton constructed by the British Columbia Portland Cement Company, Limited, with a capacity of 600 barrels daily, is now reported as abandoned. The Vancouver Portland Cement Company's mill at Tod Inlet has a total daily capacity of 3,000 barrels. The mill of the Associated Cement Company (Canada) Limited, at Bamberton, at Saanich Inlet, which has a total daily capacity of about 2,000 barrels, was idle throughout the year. At both mills, limestone, clay and shale are obtained in the vicinity of the works.

CLAYS AND CLAY PRODUCTS.¹

For a number of years a small quantity of fireclay has been produced and sold as such, and during the past few years there has been a small, but increasing production of kaolin, or china-clay from a deposit in the Province of Quebec. With these exceptions, practically all of the clay production in Canada consists almost altogether of the manufactured product.

The clay products made in Canada comprise brick of various kinds, including common and pressed, ornamental and fancy building brick, paving brick, firebrick, porous fireproofing brick and blocks, sewerpipe and drain tile, pottery and sanitary ware, the last two products chiefly from imported clays.

The total value of the clay products sold or marketed in 1917 was \$4,779,038, as compared with a value of \$4,120,805 in 1916; \$3,914,488 in 1915; \$6,871,957 in 1914; \$9,504,314 in 1913, and \$10,575,869 in 1912.

The value of the production in 1917 was greater than that of 1916 by \$658,233 or an increase of about 16 per cent. The production in 1917, however, was only 45 per cent of the maximum production, which was reached in 1912.

For a few years previous to 1913 the annual production of clay products increased very rapidly, having more than doubled in that period. In 1913, however, the financial stringency affected building operations to such an extent as to greatly reduce the demand for building brick. There was actually a considerable increase in the quantity of common and pressed building brick manufactured during the year, but a large falling off in sales, so that large stocks of brick must have remained in manufacturers' hands at the close of the year. In 1914 there was a large falling off both in quantities of brick made and in quantities sold, and the stocks of common and pressed brick on hand at the end of the year were reported at 242,106,000 or about 44 per cent of the number sold during the year. In 1915, there was again a large decrease both in quantity of brick made and in the quantities sold. Sales, however, exceeded actual output, stocks having been depleted to a considerable extent to supply demand. Stocks of common and pressed brick on hand at the end of the year were reported as 147,817,000, or about 61 per cent of the stocks reported at the end of 1914. All classes of clay products showed a falling off in production, with the exception of firebrick, pottery and kaolin.

During 1916 and 1917, however, the total quantity of brick sold was about the same as that manufactured, and at the end of 1917 stocks had fallen to about 75,000,000.

The average number of men employed in 1917 was 3,915, as compared with 4,164 in the previous year, and the total wages paid were \$2,174,167, as against \$1,740,900 in 1916.

Of the total value of the sales in 1917, building brick and fireproofing contributed \$3,101,585, or about 64.8 per cent. Sewerpipe and tile production in 1917 were valued at \$1,218,470, or 25.5 per cent of the total. The total value of the production of pottery was \$604,495, of which \$122,878 only is estimated as attributable to Canadian clays, the balance being credited to imported clays.

The value of the production of fireclays and firebrick from domestic clay, was \$326,511, and the production of kaolin was 533 tons valued at \$9,594.

Detailed statistics of production of the several classes of clay products by provinces in 1916 and 1917, are shown in the following tables:—

¹ Special investigations of the clay and shale resources of Canada have been undertaken by the Department of Mines for a number of years, and several reports giving the results of these investigations have been published.

Information is now available regarding these materials on almost every portion of the settled part of the Dominion and may be obtained on application to the Director of the Mines Branch at Ottawa.

The Laboratory established in the Mines Branch building for the testing of clays is very completely equipped and material will be received and tested there free of charge under certain conditions stated in the description of the Laboratories of the Mines Branch—Bulletin No. 13, pp. 45-46.

Production of Clay Products by Provinces, 1917.

Province.	Per cent of total value.	No. of active firms reporting.	No. of men employed.	Wages.	Common brick.			Pressed brick.									
					No. manu- factured.	No. sold.	Value of sales.	Per M.	No. manu- factured.	No. sold.	Value of sales.	Per M.					
				\$			\$					\$				\$	
Nova Scotia	6.94	10	240	139,981	13,204,090	12,709,090	105,488	8.30	50,000	75,000	1,200	16.00					
New Brunswick	1.07	6	71	32,161	2,550,000	2,550,000	28,450	11.15									
Quebec	20.57	31	752	400,900	74,255,687	67,114,597	593,733	8.85	6,639,020	6,688,772	108,996	16.29					
Ontario	53.89	186	2,069	1,171,450	94,398,641	94,979,711	961,408	10.12	37,219,743	32,116,163	439,051	13.67					
Manitoba	2.40	10	200	43,985	7,496,100	10,359,710	114,651	11.07									
Saskatchewan	1.64	9	60	22,251	3,730,000	4,157,524	36,453	8.77	801,000	1,121,000	22,565	20.13					
Alberta	6.49	10	293	207,864	16,316,750	12,739,344	104,278	8.19	6,437,900	6,083,306	76,537	12.58					
British Columbia	7.00	14	230	155,575	4,614,731	6,020,600	55,004	9.14	304,705	324,705	4,804	14.78					
Total	100.00	276	3,915	2,174,167	216,595,999	210,630,576	1,999,465	9.49	51,472,368	46,408,946	653,153	14.07					

Province.	Paving brick.		Ornamental and terra cotta.		Refractories		Fireproofing and hollow b'dg blocks.		Pottery.		Sewerpipe.		Tiles, drain.		Kaolin.		Total.	
	No. sold.	Value.	No. sold.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.
		\$		\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia					62,650				22,854		160,817		1,387				331,542	
New Brunswick									11,306		147,269		750				51,304	
Quebec					42,188				56,746		392,211		421,401				983,310	
Ontario					41,506				275,426								2,575,304	
Manitoba																	114,651	
Saskatchewan													90				78,251	
Alberta									46,476		35,285		2,998				309,991	
British Columbia									16,088		48,180		8,082				334,685	
Total					202,530						783,762		434,708				4,779,038	
					(d)	54,234	(b)	326,511	(c)	394,733	(a)	122,878				9,594	4,779,038	(c) Of which \$299,645

(a) There was also a production of \$481,617 from imported clays.
credited to fireproofing. (d) Of which \$21,380 credited to terra cotta.

(b) There was also a production of \$61,317 from imported clays.

(a) There was also a production of \$481,617 from imported clays, credited to fireproofing. (d) Of which \$21,380 credited to terra cotta.

(b) There was also a production of \$61,317 from imported clays.

(c) Of which \$299,645

Production of Clay Products by Provinces, 1916.

Province.	Per cent of total value.	No. of active firms reporting.	No. of men employed.	Wages.	Common brick.				Pressed brick.			
					No. manu- factured.	No. sold.	Value of sales.	Per M.	No. manu- factured.	No. sold.	Value of sales.	Per M.
				\$			\$	\$			\$	\$
Nova Scotia.....	5.79	7	278	98,401	10,995,000	8,015,000	62,103	7.49	220,000	93,000	1,445	15.53
New Brunswick..	1.04	8	132	39,543	4,550,000	4,075,074	41,701	10.23	65,000	65,000	1,080	16.62
Quebec.....	24.11	25	829	380,249	94,673,232	93,668,357	658,909	7.03	5,810,840	3,742,133	64,269	17.17
Ontario.....	52.16	205	2,226	942,936	108,671,845	103,854,020	817,321	7.87	35,249,733	37,281,665	378,994	10.17
Manitoba.....	2.53	11	129	24,930	5,353,000	8,911,694	91,464	10.26	.....	110,050	1,984	18.95
Saskatchewan.....	1.91	11	108	26,065	5,331,000	6,751,145	58,790	8.71	700,000	430,000	6,586	15.32
Alberta.....	5.46	10	214	94,804	6,500,000	7,114,890	58,360	8.20	1,255,000	3,033,321	34,422	11.35
British Columbia..	7.10	13	248	133,952	5,427,100	4,644,495	38,176	8.23	.....	191,920	3,575	18.62
Total	100.00	290	4,164	1,740,900	241,521,177	237,034,675	1,826,844	7.71	43,360,573	44,947,089	492,355	10.95

Province.	Paving brick.		Ornamental.		Refractories		Fireproofing		Pottery.		Sewer pipe.		Tiles, drain.		Kaolin.		Total.
	No. sold.	Value.	No. sold.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	Value.	
		\$		\$													
Nova Scotia.....	.....	.....	.....	.....	.....	43,014	10,000	.....	.....	.....	121,878	.....	30	.....	.....	.....	238,470
New Brunswick..	.....	.....	.....	4,000	.....	24,200	55,945	2,700	.....	.....	157,778	.....	100	.....	.....	.....	42,881
Quebec.....	.....	.....	.....	17,102	.....	.....	218,345	35,300	.....	.....	320,453	.....	8,363	.....	17,500	.....	993,664
Ontario.....	865,900	13,844	593,811	.....	.....	.....	10,800	.....	.....	.....	.....	.....	343,677	.....	.....	.....	2,145,036
Manitoba.....	.....	.....	.....	.....	.....	7,000	6,252	.....	.....	.....	.....	.....	.....	.....	.....	.....	104,248
Saskatchewan.....	.....	.....	.....	.....	.....	.....	53,334	23,069	.....	.....	53,141	.....	.....	.....	.....	.....	78,068
Alberta.....	.....	.....	.....	.....	.....	160,348	6,839	.....	.....	.....	63,037	.....	.....	.....	.....	.....	225,140
British Columbia..	723,993	16,300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	292,698
Total	1,589,893	30,144	.....	21,102	.....	(b) 234,562	361,555	(a) 61,069	.....	.....	716,287	.....	359,387	.....	17,500	.....	4,120,805

(a) There was also a production of \$330,104 from imported clays. (b) There was also a production of \$22,484 from imported clays.

Sales of Clay Products by Provinces, 1912-1917.

Province.	1912.	1913.	1914.	1915.	1916.	1917.
Nova Scotia	\$ 272,053	\$ 332,272	\$ 266,204	\$ 221,881	\$ 238,470	\$ 331,542
New Brunswick.....	54,910	62,269	66,502	35,780	42,881	51,304
Quebec.....	1,680,460	1,606,816	1,267,700	918,425	993,664	983,310
Ontario.....	4,864,700	5,220,467	3,979,606	2,254,863	2,145,036	2,575,304
Manitoba.....	1,018,051	514,358	317,488	93,674	104,248	114,651
Saskatchewan	332,943	189,820	98,349	44,406	78,668	78,251
Alberta.....	1,356,184	893,408	462,199	115,696	225,140	309,991
British Columbia	996,568	684,904	113,909	229,763	292,698	334,685
	10,575,869	9,504,314	6,871,957	3,914,488	4,120,805	4,779,038

Annual Value of Production of Clay Products, 1899-1917.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
1899.....	\$ 2,988,099	1905.....	\$ 4,709,842	1911.....	\$ 8,359,933
1900.....	3,195,105	1906.....	5,072,635	1912.....	10,575,869
1901.....	3,382,706	1907.....	5,772,117	1913.....	9,504,314
1902.....	3,625,489	1908.....	4,500,702	1914.....	6,871,957
1903.....	4,034,289	1909.....	6,450,840	1915.....	3,914,488
1904.....	3,841,560	1910.....	7,629,956	1916.....	4,120,805
				1917.....	4,779,038

Exports and Imports.—The total value of the exports of clay products in 1917 was \$138,143, and included 4,464 M. building brick, valued at \$40,039; manufactures of clay, valued at \$83,600, and earthenware, valued at \$14,504.

Exports of Clay Products.

Calendar Year.	Building Brick.		Manu- factures.	Earthen- ware.	Total.
	M.	Value.			
1910.....	390	\$ 2,762	\$ 9,061	\$ 9,240	\$ 21,063
1911.....	394	3,977	2,071	6,101	12,149
1912.....	694	8,493	256	10,001	18,750
1913.....	977	8,579	27,201	16,553	52,333
1914.....	1,486	11,871	26,866	9,336	48,073
1915.....	1,155	9,089	25,202	11,281	45,572
1916.....	1,746	13,942	58,550	7,620	80,112
1917.....	4,464	40,039	83,600	14,504	138,143

The imports of clays and clay products reached a total value during the calendar year 1917 of \$6,610,837, which exceeded the domestic production by \$1,831,804. The total imports in 1916 were valued at \$4,554,167.

Clay imports are classified by the Department of Customs under three main divisions, including: brick and tile; earthenware and chinaware; and clays. The imports of clays in 1917 were valued at \$416,209, and included chiefly china-clay and fireclay, with a small quantity of pipe clay, and other clays not classified. The value of china-clay imported was \$97,856, and of fireclay, \$283,746.

The imports classified under brick and tile which apparently include products other than clay products, such as refractory silica brick, and magnesite brick, were valued in 1917 at \$3,599,046, as compared with a value in 1916 of \$2,048,259. A large portion of these imports is made up of firebrick, about 75 per cent of the total in 1917. The imports of magnesite brick during the last nine months of the year were valued at \$470,801.

The imports of earthenware and chinaware, of which the most important is tableware, were valued in 1917 at \$2,595,582, as compared with a value of \$2,180,414 in 1916. These imports are chiefly of a class of goods not manufactured in Canada and for which the raw materials are not as yet obtainable from Canadian sources.

Imports of Clay Products, Calendar Years, 1912 to 1917.

129

	Imports.					1917.
	1912.	1913.	1914.	1915.	1916.	
Brick and tile— Bath brick..... Building brick..... Building blocks..... Paving brick..... Firebrick, of a class or kind not made in Canada (free). Firebrick, n.o.p..... Magnesite brick (9 mos.)..... Firebrick, n.o.p..... Drain tile, not glazed..... Drain pipe, sewer pipe, and earthenware fittings therefor, chimney linings or vents, chimney tops and inverted blocks, glazed or unglazed..... Manufactures of clay, n.o.p..... Total.....	\$ 1,927 763,470 (b) 160,063 953,621 (p) 4,018 507,024 818,467 3,209,190	\$ 2,690 575,269 (a) 356,366 176,497 976,937 (a) 216,760 12,156 465,997 339,769 3,121,592	\$ 1,894 353,353 276,817 145,063 535,712 154,421 2,941 338,533 178,056 1,986,790	\$ 630 114,958 181,145 70,268 577,458 235,613 346 41,801 72,649 1,801,359	\$ 902 118,687 69,333 37,814 1,162,679 495,113 2,072 40,233 88,952 2,048,259	\$ 2,299 61,511 151,765 37,814 1,994,212 (a) 470,801 691,578 2,289 42,864 143,913 3,599,046
Earthenware and chinaware— Brown or coloured earthenware and stoneware, and Rockingham ware..... C. C. or cream coloured ware, decorated, printed or sponged, and all earthenware, n.o.p..... Demijohns, churns, or crocks..... Tableware of china, porcelain, white granite or iron-stoneware..... China and porcelain ware, n.o.p..... Tiles or blocks of earthenware or stone prepared for mosaic flooring..... Earthenware tiles, n.o.p..... Manufactures of earthenware, n.o.p..... Total.....	62,161 291,804 18,404 2,065,362 71,751 160,082 239,391 183,001 3,094,956	70,632 264,090 32,599 2,185,601 43,696 173,445 296,791 248,016 3,314,870	71,083 163,431 25,935 1,437,175 30,006 104,285 186,161 174,146 2,192,222	74,864 135,425 14,752 1,016,900 18,312 40,286 92,700 66,771 1,460,010	145,490 176,329 16,632 1,566,312 17,304 41,189 74,293 142,865 2,180,414	120,369 216,052 43,066 2,002,884 24,791 24,904 65,178 97,738 2,595,582
Clays— China-clay, ground or unground..... Fireclay, ground or unground..... Pipeclay, ground or unground..... Clays, all other, n.o.p..... Totals..... Grand total.....	127,402 140,500 234 20,258 288,394 6,592,540	149,337 143,399 385 31,169 324,290 6,700,752	150,881 90,233 829 46,185 288,128 4,467,140	121,658 87,267 614 24,557 237,096 2,998,465	114,110 187,124 2,440 21,820 325,494 4,554,167	97,856 283,746 2,427 32,180 416,209 6,610,837
Baths, bath-tubs, basins, closets, lavatories, urinals, sinks and laundry tubs of any material..... Chalk, china or cornwall stone, cliff stone and feldspar, flucorspar, magnesite, ground or unground.....	382,990 167,990	477,133 164,879	359,288 113,211	182,757 100,012	173,244 170,498	231,277 264,720

(a) Nine months. (b) Included in manufactures of clay, n.o.p.

Imports of Clay Products during the Twelve Months ending March 1917, showing Countries of Origin.

230

Imports.	Great Britain.	United States.	France.	Japan.	Other Countries.	Total.
Brick and tile—	\$	\$	\$	\$	\$	\$
Bath brick.....	733	18				751
Building brick.....	2,311	112,094				114,405
Building blocks.....	127	91,375				91,502
Paving brick.....	12,744	52,733				65,497
Firebrick of a class or kind not made in Canada.....	32,221	453,838				516,059
Firebrick, n.o.p.....	131,010	1,140,963				1,271,973
Drain tile, not glazed.....	300	1,885				2,185
Drain pipe, sewer pipe, and earthenware fittings therefor, chimney linings or vents, chimney tops and inverted blocks, glazed or unglazed.....	9,203	35,361				44,564
Manufactures of clay, n.o.p.....	10,532	86,172	5	101		96,810
Total.....	199,181	2,004,459	5	101		2,203,746
Earthenware and chinaware—						
Brown or coloured earthenware and stoneware, and Rockingham ware.....	39,918	101,230	182	4,400	1,431	147,062
C.C. or cream coloured ware, decorated, printed or sponged, and all earthenware n.o.p.....	100,908	79,658	408	6,383	404	187,761
Demijohns, churns or crocks.....	2,547	15,589			229	18,365
Tableware of china, porcelain, white granite or iron-stoneware.....	1,308,830	88,630	97,248	231,322	32,565	1,758,595
China ware, to be silver mounted, imported by manufacturers of silverware.....	315					315
China and porcelain ware, n.o.p.....	5,618	7,857		2,608	852	16,935
Tiles or blocks of earthenware or stone prepared for mosaic flooring.....	5,417	32,804				38,221
Earthenware tiles, n.o.p.....	40,440	34,322				74,762
Manufactures of earthenware, n.o.p.....	30,402	110,447	153	6,030	278	147,310
Total.....	1,534,296	470,537	97,991	250,743	35,759	2,389,326
Clays—						
China-clay, ground or unground.....	46,064	61,674				107,738
Fireclay, ground or unground.....	10,858	162,974		18		173,850
Pipeclay, ground or unground.....	43	2,739				2,782
Clays, all other, n.o.p.....	199	20,257		21		20,477
Total.....	57,164	247,644		39		304,847
Grand total.....	1,790,641	2,722,640	97,996	250,883	(a) 35,759	4,897,919
Per cent of total.....	36.6	55.6	2.0	5.1	0.7	100.0
Baths, bath-tubs, basins, closets, lavatories, urinals, sinks and laundry tubs of any material.....						
Chalk, china or cornwall stone, cliff stone and feldspar, flintspar, magnesite, ground or unground.....	90,034	84,722		7		174,763
	42,037	116,934				158,971

(a) Of which \$29,991 are imports from Holland.

Imports of Clay Products (Total Value) 1909-17.

Calendar Year.	Brick and Tile.	Earthenware and Chinaware.	Clays.	Totals.
1909.....	1,249,450	1,781,759	216,330	3,247,539
1910.....	1,755,773	2,283,116	292,508	4,331,397
1911.....	2,369,761	2,516,536	270,247	5,156,544
1912.....	3,209,190	3,094,956	288,394	6,592,540
1913.....	3,121,592	3,314,870	324,290	6,760,752
1914.....	1,986,790	2,192,222	288,123	4,467,140
1915.....	1,801,359	1,460,010	237,096	2,998,465
1916.....	2,048,259	2,180,414	325,494	4,554,167
1917.....	3,599,046	2,595,582	416,209	6,610,837

Total Consumption of Clay Products.—An approximate estimate of the annual value of the consumption of clay products in Canada may be deduced from the available records of production—exports and imports. The total value of the consumption for the year 1917 estimated on this basis was \$11,251,732, of which 42·5 per cent was of domestic production. The approximate value of consumption in 1916 was \$8,594,860, of which 48 per cent was of domestic production. The following table shows the annual value of consumption of clay products since 1909 as well as the percentage of the total obtained from domestic sources. It will be observed that the maximum value of consumption was reached in 1912, but that in 1915 the consumption had fallen to but little more than one-third of this maximum. In 1916 and 1917, however, the value of consumption has again showed a substantial increase, though a much larger percentage of the total is now obtained outside of Canada than formerly. This increased consumption has been made up largely of refractory brick, including fire-brick, silica brick, and magnesite brick, used as furnace linings.

Estimated Annual Value of Consumption of Clay Products.

Calendar Year.	Total Value of Consumption.	Per cent of Total supplied by Domestic Production.	Calendar Year.	Total Value of Consumption.	Per cent of Total supplied by Domestic Production.
	\$			\$	
1909.....	9,696,324	70·0	1914.....	11,291,024	61·0
1910.....	11,958,591	63·8	1915.....	6,867,381	57·0
1911.....	13,516,477	62·0	1916.....	8,594,860	48·0
1912.....	17,149,659	62·0	1917.....	11,251,732	42·5
1913.....	16,212,733	58·6			

CLAY BUILDING BRICK.

The total sales from Canadian plants of clay building brick including common and pressed brick, but excluding ornamental, paving brick and fireproofing brick, are shown by provinces for the past two years in the following table. The production of common and pressed brick of which these figures are the totals have already been given in the general table of production of clay products.

Sales of Clay Building Brick (Common and Pressed) 1916, and 1917.

Province.	1916.			1917.		
	No. Sold	Value.	Per Cent of Total Value.	No. Sold.	Value.	Per Cent of Total Value.
		\$			\$	
Nova Scotia.....	8,108,000	63,548	2.74	12,784,090	106,688	4.02
New Brunswick.....	4,140,074	42,781	1.85	2,550,000	28,450	1.07
Quebec.....	97,410,490	723,178	31.18	73,803,369	702,729	26.49
Ontario.....	141,135,685	1,196,315	51.58	127,095,874	1,400,459	52.80
Manitoba.....	9,021,744	93,448	4.03	10,359,710	114,651	4.32
Saskatchewan.....	7,181,145	65,376	2.82	5,278,524	59,018	2.23
Alberta.....	10,148,211	92,782	4.00	18,822,650	180,815	6.82
British Columbia.....	4,836,415	41,711	1.80	6,345,305	59,808	2.25
Total.....	231,981,764	2,319,199	100.00	257,039,522	2,652,618	100.00

Large stocks of brick were reported as being in manufacturers' hands at the close of 1915, the total number being 147,817 M. brick, or equivalent to 52 per cent of that year's sales. Stocks at the end of 1917 were reduced to about 75,000,000, equivalent to about 30 per cent of the year's sales.

A record of stocks on hand, by provinces in 1916-17 is shown in the following table:—

Common and Pressed Brick Held in Stock by Manufacturers, December 31, 1916, and 1917.

Province.	1916.			1917.		
	Common Brick. M.	Pressed Brick. M.	Total. M.	Common Brick. M.	Pressed Brick. M.	Total. M.
Nova Scotia	1,980	127	2,107	2,115	50	2,165
New Brunswick.....	1,614	20	1,634	570	.....	570
Quebec.....	20,535	3,884	24,419	6,573	3,507	10,080
Ontario	41,368	8,755	50,123	30,186	10,133	40,319
Manitoba.....	5,728	289	6,017	4,595	.....	4,595
Saskatchewan.....	3,177	325	3,502	2,526	314	2,840
Alberta.....	5,417	1,502	6,919	6,913	3,119	10,032
British Columbia.....	6,060	876	6,936	4,118	150	4,268
Total.....	85,879	15,778	101,657	57,596	17,273	74,869

Prices.—The price of brick varies greatly with the quality, locality, market, or demand, the values as given in the tables of production are those at yard, or kiln, and do not include costs of delivery. They do not, therefore, represent the total cost to the consumer. The average values of common and pressed brick at kilns in each province during the years 1914, 1915, 1916, and 1917 are given in the following table:—

Average Prices per Thousand of Common and Pressed Brick.

	Common brick.				Pressed brick.			
	1914.	1915.	1916.	1917.	1914.	1915.	1916.	1917.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Nova Scotia.....	7 75	7 53	7 49	8 30	15 32	15 00	15 53	16 00
New Brunswick.....	10 61	9 29	10 23	11 15	22 50	22 00	16 62	.....
Quebec.....	7 40	7 10	7 03	8 85	15 91	15 73	17 17	16 29
Ontario.....	7 86	7 34	7 87	10 12	10 77	9 16	10 17	13 67
Manitoba.....	10 79	10 10	10 26	11 07	12 59	.....	18 95	.....
Saskatchewan.....	8 98	8 72	8 71	8 77	17 31	16 82	15 32	20 13
Alberta.....	7 92	8 63	8 20	8 19	13 52	9 88	11 35	12 58
British Columbia.....	8 56	9 23	8 23	9 14	26 50	21 41	18 62	14 78
Canada.....	7 99	7 48	7 71	9 49	11 91	9 89	10 95	14 07

Exports and Imports of Building Brick.—The exports of building brick have never been large, averaging for a considerable number of years prior to 1909 about \$6,000. The exports fell off somewhat from 1909 to 1911, but increased again to a value of \$11,871 in 1914 and \$40,039 in 1917. The record of exports for a number of years will be found in a previous table.

The annual imports for a number of years previous to 1903 averaged only about \$20,000 in value. During the past ten years, however, the imports rapidly increased from \$100,000 to over \$760,000 in 1912, since which date there has been a fairly steady decrease, and the imports during the calendar year 1917 were less than those of any year since 1903 and amounted to 4,111,000 brick, valued at \$61,511.

Imports of Building Brick.

Calendar year.	M.	Value.	Calendar year.	M.	Value.	Calendar year.	M.	Value.
		\$			\$			\$
1907.....	12,961	129,235	1911.....	51,102	475,865	1915.....	10,168	114,958
1908.....	14,931	110,981	1912.....	81,425	763,470	1916.....	10,083	118,687
1909.....	27,972	195,360	1913.....	56,846	575,269	1917.....	4,111	61,511
1910.....	29,049	274,482	1914.....	30,022	353,353			

Ontario.—The production of building brick in the several provinces has already been set forth in the tabulated statements. The Province of Ontario is credited in 1917 with over 52 per cent of the brick production of Canada. The total sales as reported by 186 firms were 127,095,874 brick, valued at \$1,400,459 including 94,979,711 common brick, valued at \$961,408 or an average of \$10.12 per thousand; and 32,116,163 pressed brick, valued at \$439,051, or an average of \$13.67 per thousand.

The city of Toronto and vicinity, including the counties of York, Peel, and Halton, is the principal brick making section, and in 1917 produced over 63 per cent of the Ontario production and about 33½ per cent of the total Canadian production of brick. The county of Wentworth, comprising the city of Hamilton and vicinity, produced about 14 per cent of the Ontario production, the greater part of the pressed brick reported as such was made in the Toronto and Hamilton districts.

The production by principal counties in Ontario in 1916 and 1917 is shown in the accompanying tables:—

Sales of Common and Pressed Brick in Ontario by Principal Counties, 1917.

County.	Common.			Pressed.			Total value.	Per cent.
	No.	Value.	Per M	No.	Value.	Per M		
		\$	\$		\$		\$	
Carleton.....	3,964,000	40,130	10.12				40,130	2.87
Essex.....	1,798,586	14,750	8.20				14,750	1.05
Halton and Peel.	9,621,000	80,024	8.32	24,682,030	328,871	13.32	408,895	29.20
Kent.....	3,678,894	38,038	10.34				38,038	2.72
Lincoln.....	1,500,000	16,500	11.00				16,500	1.18
Middlesex.....	2,817,275	28,060	9.96				28,060	2.00
Peterboro.....	2,095,000	24,092	11.50				24,092	1.72
Renfrew.....	1,293,600	15,175	11.74				15,175	1.08
Thunder Bay District..	2,770,100	27,450	9.91				27,450	1.96
Victoria.....	1,240,000	13,280	10.71				13,280	0.95
Wentworth.....	15,320,667	145,715	9.51	3,607,250	49,592	13.75	195,307	13.95
York.....	39,653,627	420,409	10.58	3,752,913	59,163	15.76	479,572	34.24
Total, 13 counties.....	85,752,749	863,623	10.07	32,042,193	437,626	13.66	1,301,249	92.92
Total, other counties..	9,226,962	97,785	10.60	74,970	1,425	19.00	99,210	7.08
Total, Ontario.....	94,979,711	961,408	10.12	32,116,163	439,051	13.67	1,400,459	100.00

Sales of Common and Pressed Brick in Ontario by Principal Counties, 1916.

County.	Common.			Pressed.			Total value.	Per cent.
	No.	Value.	Per M	No.	Value.	Per M		
		\$	\$		\$	\$	\$	
Algoma.....	1,325,000	12,650	9.55	4,000	60	15.00	12,710	1.06
Carleton.....	4,513,088	36,973	8.19				36,973	3.09
Halton and Peel.	8,567,000	60,382	7.05	28,340,000	286,266	10.10	346,648	28.97
Kent.....	6,215,050	48,443	7.79				48,443	4.06
Lincoln.....	2,157,455	20,173	9.35				20,173	1.69
Middlesex.....	3,734,160	32,556	8.72				32,556	2.72
Nipissing.....	1,160,900	10,191	8.78				10,191	0.85
Peterboro.....	1,465,000	13,918	9.50				13,918	1.16
Renfrew.....	2,502,330	22,960	9.17				22,960	1.92
Sudbury.....	1,480,000	14,800	10.00				14,800	1.24
Thunder Bay.....	1,476,650	12,274	8.31				12,274	1.03
Waterloo.....	1,892,275	14,700	7.77				14,700	1.23
Wentworth.....	14,442,815	101,162	7.01	6,329,288	53,543	8.46	154,705	12.93
York.....	39,095,893	308,798	7.90	2,608,377	39,125	15.00	347,923	29.08
Total, 15 counties....	90,007,616	709,980	7.89	37,281,665	378,994	10.17	1,088,974	91.03
Total, other counties..	13,846,404	107,341	7.75				107,341	8.97
Total, Ontario.	103,854,020	817,321	7.87	37,281,665	378,994	10.17	1,196,315	100.00

CLAY PAVING BRICK.

Paving brick has been made in Canada, chiefly at West Toronto, Ontario, from shale obtained from the banks of the Humber river, and more recently during the years 1914, 1915, and 1916 there has been a small production reported from Clayburn, B.C.

There was no production of paving brick reported for the year 1917. The annual production for a number of years has varied from 3,000,000 to over 5,000,000 per season.

The imports of paving brick during the past five years have considerably exceeded the domestic production. During the calendar year 1917 the imports were 2,190,000 valued at \$37,814, or an average value of \$17.27 per thousand, as against imports of 5,667,000 valued at \$70,268 in 1916.

Annual Production of Paving Brick.*

Year.	M.	Value.	Average per M.	Year.	M.	Value.	Average per M.
1897.....	4,568	\$ 45,670	\$ 10 00	1907.....	3,618	\$ 72,354	\$ 20 00
1898.....				1908.....	3,720	59,456	15 93
1899.....	5,800	42,550	8 03	1909.....	3,760	67,408	17 93
1900.....	2,710	26,950	9 94	1910.....	4,215	78,980	18 74
1901.....	3,689	37,000	10 03	1911.....	5,220	79,444	15 22
1902.....	4,211	42,000	9 97	1912.....	4,580	85,989	18 78
1903.....	3,789	45,288	11 95	1913.....	4,208	75,669	17 98
1904.....	4,436	55,450	12 50	1914.....	2,707	49,627	18 33
1905.....	4,500	54,000	12 00	1915.....	1,228	20,694	16 85
1906.....	3,000	45,000	15 00	1916.....	1,590	30,144	18 96
				1917.....	Nil	Nil	Nil

* Figures previous to 1907 compiled from Ontario Bureau of Mines.

Imports of Paving Brick.

Calendar Year.	M.	Value.	Average per M.	Calendar Year.	M.	Value.	Average per M.
1907.....	5,438	\$ 62,570	\$ 11 51	1913.....	13,035	\$ 176,497	\$ 13 54
1908.....		100,013		1914.....	9,069	145,063	16 00
1909.....		139,336		1915.....	5,865	76,759	13 09
1910.....	10,503	124,994	11 90	1916.....	5,667	70,268	12 40
1911.....	11,450	164,292	14 34	1917.....	2,190	37,814	17 27
1912.....	11,793	106,663	13 62				

FIRECLAY AND FIRECLAY PRODUCTS.¹

(BY JOSEPH KEELE.)

Fireclays as the name implies are those clays which can be subjected to high temperatures without softening, or deformation. This property of resistance to heat is termed refractoriness. Other materials besides fireclays, such as silica, magnesia, bauxite and chrome have the property of refractoriness, hence brick made from all these materials comes under the general head of refractories.

¹ References to occurrences of fireclays in Canada: "The Clay Resources of Southern Saskatchewan", N. B. Davis, Mines Branch. "Refractory Materials in Canada", J. Keele, Summary Report, Mines Branch, 1916—pp. 111-117.

Raw fireclays are classed according to their refractoriness as No. 1, 2 and 3. No. 1 fireclay is required to stand a temperature of cone 33 (3254 degrees F.) without softening and No. 3 fireclays are required to stand up at cone 26 (3,000 degrees F.). Clays which soften at temperatures between 2,600 and 3,000 degrees F. are called semi-refractory.

Fireclays occur at two points in Nova Scotia, at several localities in southern Saskatchewan, and at Clayburn in British Columbia. Fireclays are also known to occur on the Mattagami and Missinaibi rivers in northern Ontario, and on the Athabaska river below Fort McMurray in northern Alberta, but the deposits in both these regions are beyond the reach of transportation facilities at present.

Semi-refractory clays occur in the coal measures at Westville, Nova Scotia, and at Flower cove and Minto in New Brunswick, and at several points in Southern Saskatchewan.

Firebrick are manufactured at Sydney Mines, N.S. from fireclay brought from Shubenacadie, N.S., and at Claybank, Sask., and at Clayburn and Kilgard, B.C.

The manufacture of firebrick has recently begun at St. Remi d'Amherst, Que., by the Canadian China Clay Company who use the discoloured kaolin in their deposit for this purpose.

Some refractory brick are made at Westville, N.S., from a shale which occurs in the coal measures in that vicinity.

As there are no fireclays, or semi-refractory clays known to occur in Ontario or Quebec, except those alluded to above, it is necessary to import either the raw clay, or the finished refractories, but most of the refractory material is imported in the finished state. A good deal of fireclay is imported, however, from the States of New Jersey and Pennsylvania and made into special shapes for furnace work and for stove linings, etc.

No. 1 fireclay was quoted at \$7 per ton and No. 2 fireclay at \$6 per ton on boat or cars at New Jersey points in 1917.

The total value of the sales of fireclay, firebrick, and fireclay bricks in 1917 was \$326,511, as compared with a valuation of \$234,562 in 1916. There was in addition in 1917, a production of fireclay products valued at \$61,317 reported as being made from imported clays. The production in 1917 included: fireclay, or refractory clay sold as such 10,534 tons, valued at \$49,455; firebrick 8,192,213 valued at \$199,171, or an average of \$24.31 per thousand, and other fireclay products valued at \$77,885. The production in 1916 included: fireclay, or refractory clay sold as such, 9,206 tons, valued at \$30,767; firebrick 5,688,511, valued at \$147,757, or an average of \$25.97 per thousand; and other fireclay products valued at \$56,038.

The imports of firebrick during the calendar year 1917, including magnesite brick, and probably other refractory brick such as silica brick, were valued at \$3,156,591. The imports of magnesite brick during the last nine months of the year have been separately stated having a value for that period included in the above table of \$470,801.

The imports of firebrick during the calendar year 1916 were valued at \$1,657,792, of which \$1,495,868 was from the United States, and \$161,924 from Great Britain.

Fireclay was imported during the calendar year 1917, to the value of \$283,746, as compared with a value of \$187,124 in 1916.

Statistics of the annual production since 1907 of firebrick, refractory clay, or fireclay sold as such, and of fireclay products, and statistics of the imports of firebrick and fireclay, are shown in the following tables:—

Production of Fireclay and Fireclay Products.

Year.	Firebrick.			Fireclay.			Other fireclay products.	Total value.
	No. sold.	Value.	Per M.	Tons.	Value.	Per ton.	Value.	
1907	4,323,179	\$113,322	\$26.21	.....	.....	.....	\$18,000	\$131,322
1908	2,415,871	70,429	29.16	1,984	\$ 8,121	\$1.09	31,752	110,302
1909	1,059,270	32,742	30.92	4,405	12,390	2.81	33,000	78,132
1910	1,375,400	21,352	21.34	1,425	5,863	4.11	15,000	50,215
1911	2,367,937	44,122	18.63	7,532	24,128	3.20	20,880	89,130
1912	3,429,594	67,192	19.59	6,307	24,343	3.86	34,050	125,585
1913	3,667,276	86,164	23.50	3,345	14,018	4.19	42,556	142,738
1914	2,815,690	72,299	25.67	2,171	12,875	5.93	22,394	107,568
1915	2,895,640	68,700	23.73	2,328	12,065	5.18	29,928	110,693
1916	5,688,511	147,757	25.97	9,206	30,767	3.34	56,038	234,562
1917	8,192,213	199,171	24.31	10,534	49,455	4.70	77,885	326,511

Imports of Firebrick and Fireclay.

Calendar year.	Fireclay.	Firebrick.	Calendar year.	Fireclay.	Firebrick.	Calendar year.	Fireclay.	Firebrick.
1907	\$152,485	\$641,811	1911	\$125,199	\$ 814,414	1915	\$ 87,267	\$ 813,071
1908	86,879	380,905	1912	140,500	953,621	1916	187,124	1,657,792
1909	86,161	485,994	1913	143,399	1,192,857	1917	283,746	3,156,591
1910	124,293	811,927	1914	90,233	690,133			

SEWERPIPE AND DRAIN TILE.

The total value of the sales of sewerpipe in 1917 was \$783,762, as compared with a value of \$716,287 in 1916. About 50 per cent of the value of the production in 1917 is credited to Ontario.

The imports of drain pipe and sewerpipe during 1917 were valued at \$42,864, as compared with a value of imports in 1916 of \$40,233.

The total sales of drain tile in Canada in 1917 as reported to this Branch, were valued at \$434,708, as compared with sales valued at \$359,387 in 1916. The greater part of this production is in Ontario, the sales in this Province as reported by the producers to this office being 21,445,000 valued at \$421,401, as against 20,205,837 valued at \$343,677 in 1916.

The imports of unglazed tile are apparently small, the value during the calendar year 1917 being \$2,289, as compared with \$2,072 in 1916.

Statistics of the annual production of sewerpipe and of the imports of drain tile and sewerpipe are shown in the following tables:—

Production of Sewerpipe.

Calendar year.	Value.	Calendar year.	Value.	Calendar year.	Value.	Calendar year.	Value.
1888	\$ 266,320	1896	\$ 153,875	1904	\$ 440,894	1912	\$ 884,641
1889	*	1897	164,250	1905	382,000	1913	1,035,906
1890	348,000	1898	181,717	1906	350,045	1914	1,104,499
1891	227,300	1899	161,546	1907	667,100	1915	799,446
1892	367,660	1900	231,525	1908	514,362	1916	716,287
1893	350,000	1901	248,115	1909	645,722	1917	783,762
1894	250,325	1902	301,965	1910	774,110		
1895	257,045	1903	317,970	1911	812,716		

* No record.

Imports of Drain Tile and Sewerpipe.

Calendar year.	Drain tile. (a)	Sewerpipe. (b)	Calendar year.	Drain tile. (a)	Sewerpipe. (b)
1907.....	2,011	130,698	1913.....	12,156	465,997
1908.....	2,056	108,189	1914.....	2,941	338,533
1909.....	2,785	170,280	1915.....	346	41,801
1910.....	4,485	175,599	1916.....	2,072	40,233
1911.....	5,640	382,929	1917.....	2,289	42,864
1912.....	4,018	507,024			

(a) Drain tile, not glazed.

(b) Drain pipe, sewerpipe, and earthenware fittings therefor, chimney linings, or vents, chimney tops and inverted blocks, glazed or unglazed.

POTTERY AND EARTHENWARE.¹

(By JOSEPH KEELE.)

Sanitary porcelain is made at St. Johns, Que., and electrical porcelain is made at Hamilton and Peterboro, Ont. These are the only firms in Canada at present making white wares. The raw materials, including clays, ground quartz and feldspar, are all imported.

Stoneware pottery such as crocks, jars, churns, and jardinières, is made at Medicine Hat, Alberta, from Saskatchewan clay; at Hamilton, Ont., from imported clays, and at St. John, N.B., partly from Nova Scotia clay.

Flower pots are made at a few localities from the red burning brick and tile clays of the vicinity.

Quite an appreciable amount of stoneware clay is imported into Canada for modelling purposes either by sculptors or for use in schools giving instruction in the manual arts. This clay is supplied in a finely ground state and shipped in paper-lined barrels. The price quoted in 1917 was \$15 per ton at point of shipment.

Stoneware clay for ordinary factory use was quoted at \$4 per ton, on boat or cars in New Jersey in 1917.

The total value of the production of pottery and clay sanitary ware in 1917, according to returns received, was \$604,495, of which it is estimated that a value of \$481,617 is attributable to imported clays. The total value of the production in 1916 was \$391,173, of which \$330,104 was credited to imported clays.

Annual Production of Pottery.

Calendar year.	Value.	Calendar year.	Value.	Calendar year.	Value.	Calendar year.	Value.
1888.....	\$ 27,750	1896.....	\$ 163,427	1904.....	\$ 140,000	1912.....	\$ 43,955
1889.....*		1897.....	129,629	1905.....	120,000	1913.....	53,533
1890.....	195,242	1898.....	214,675	1906.....	150,000	1914.....	35,371
1891.....	258,844	1899.....	185,000	1907.....	253,809	1915.....	64,900
1892.....	265,811	1900.....	200,000	1908.....	200,541	1916.....	61,069
1893.....	213,186	1901.....	200,000	1909.....	285,285	1917.....	122,878
1894.....	162,144	1902.....	200,000	1910.....	250,924		
1895.....	151,888	1903.....	200,000	1911.....	102,493		

* Not available.

A detailed record of the imports of earthenware and chinaware will be found in the tables on pages 15 and 16.

¹ References to pottery clays in Canada: "Summary Report", Mines Br., 1917, pp. 112-114. "Clay Resources of Southern Saskatchewan", N. B. Davis, Mines Branch, 1918.

KAOLIN.

The shipments of kaolin in 1917 were 533 tons, valued at \$9,594, as compared with 1,750 tons, valued at \$17,500, in 1916.

The production was obtained from the deposits in the township of Amherst, Ottawa county, Quebec, operated by the Canadian China Clay Company, of Montreal, and since the beginning of operations has been as follows:—

Annual Production of Kaolin.

Year.	Tons.	Value.	Average.	Year.	Tons.	Value.	Average.
1912.....	20	\$ 160	\$ 8 00	1915. . .	1,300	\$ 13,000	\$ 10 00
1913.....	500	5,000	10 00	1916.....	1,750	17,500	10 00
1914.....	1,000	10,000	10 00	1917.....	533	9,594	18 00

The plant for refining the clay is situated 2 miles from St. Remi d'Amherst, and 7 miles from Huberdeau, the terminus of the Montfort branch of the Canadian Northern Quebec Railway, 46 miles northwest of Montreal.

The imports of china-clay, ground and unground, into Canada during the twelve months ending December, 1917, were 11,596 tons, valued at \$97,856, or \$8.44 per ton, as against imports of 19,062 tons, valued at \$114,110, or \$5.99 per ton, in 1916.

Annual Imports of China-Clay.

Calendar year.	Tons.	Value.	Value per ton.	Calendar year.	Tons.	Value.	Value per ton.
1907.....	13,242	\$102,209	\$7 72	1913....	21,164	\$149,337	\$ 7 06
1908... ..	10,781	87,984	8 16	1914. . .	20,437	150,881	7 38
1909.....	12,791	100,066	7 82	1915.....	21,940	124,658	5 68
1910.	18,216	142,125	7 80	1916.....	19,062	114,110	5 99
1911.....	18,819	125,768	6 68	1917.....	11,596	97,856	8 44
1912.....	18,332	127,402	6 95				

LIME.

The production of lime in 1917 is reported as 6,567,170 bushels, equivalent to about 229,851 tons, valued at \$1,558,487, or an average of 23.7 cents per bushel, or \$6.78 per ton, showing a considerable increase both in quantity and value over the production in 1916, which was 5,493,250 bushels, equivalent to about 192,264 tons, and valued at \$1,091,463, or an average of 20 cents per bushel, or \$5.75 per ton.

The average price per bushel of lime sold in 1917 varied from a minimum of 20 cents in Nova Scotia to a maximum of 34 cents in Alberta. About 88 per cent of the total production in 1917 was derived from Ontario, Quebec, and the Maritime Provinces.

The production of hydrated lime in 1917 was reported as 16,339 tons, the producing firms being as follows, viz.:—

The Standard Lime Co., Ltd., Joliette, Que.
 Laurentian Stone Co., Hull, Que.
 Standard White Lime Co., Ltd., Guelph, Ont.
 Christie, Henderson & Co., Ltd., Hespeler, Ont.
 Elora White Lime Co., Ltd., Elora, Ont.
 The Contractors Supply Co., Ltd., Orangeville, Ont.
 The Toronto Plaster Company, Teeswater, Ont.
 The Moose Horn Lime Company, Moose Horn, Man.
 The Pacific Lime Co., Ltd., Blubber Bay, B.C.

Lime Production by Provinces, 1917.

Province.	No. of active firms reporting.	Men employed.	Wages paid.	Sales.			
				Bushels.	Value.	Average per bushel.	Per cent of total value.
			\$		\$	\$	
P. E. Island	1	1	34	820	287	0.350	12.66
Nova Scotia	1	7	10,736	985,286	197,057	0.200	
New Brunswick	6	112	64,515	532,251	171,248	0.322	10.99
Quebec	16	209	130,016	1,470,486	335,012	0.228	21.50
Ontario	33	318	250,076	2,846,850	668,368	0.235	42.89
Manitoba	4	60	42,413	393,982	92,932	0.236	5.96
Alberta	3	19	16,682	104,540	35,516	0.340	2.28
British Columbia	3	44	40,145	232,955	58,067	0.245	3.72
Total	67	770	554,617	6,567,170	1,558,487	0.237	100.00

Lime Production by Provinces, 1916.

Province.	No. of active firms reporting.	Men employed.	Wages paid.	Sales.			
				Bushels.	Value.	Average per bushel.	Per cent of total value.
			\$		\$	\$	
P. E. Island.....	1	2	81	1,734	546	0.315	0.05
Nova Scotia.....	1	10	8,956	909,800	181,960	0.200	16.67
New Brunswick.....	5	82	45,272	424,113	104,635	0.247	9.59
Quebec.....	21	270	101,121	1,498,845	267,119	0.178	24.47
Ontario.....	37	278	161,312	2,031,396	367,115	0.181	33.64
Manitoba.....	5	54	30,232	355,301	83,754	0.236	7.67
Alberta.....	3	18	7,919	78,019	20,033	0.257	1.84
British Columbia.....	3	44	26,472	194,042	66,301	0.342	6.07
Total.....	76	758	381,365	5,493,250	1,091,463	0.199	100.00

Lime Production by Provinces, 1915.

Province.	No. of active firms reporting.	Men employed.	Wages paid.	Sales.			
				Bushels.	Value.	Average per bushel.	Per cent of total value.
			\$		\$	\$	
Nova Scotia.....	1	10	4,802	915,086	183,017	0.200	18.02
New Brunswick.....	5	77	39,572	369,117	93,797	0.254	9.23
Quebec.....	20	209	100,449	1,351,306	274,831	0.203	27.06
Ontario.....	40	240	97,298	1,903,914	328,515	0.173	32.34
Manitoba.....	5	55	27,948	281,432	71,372	0.254	7.03
Alberta.....	4	22	8,288	74,152	14,445	0.195	1.42
British Columbia.....	3	20	15,378	152,237	49,725	0.327	4.90
Total.....	78	633	293,735	5,047,244	1,015,702	0.201	100.00

Annual Production of Lime by Provinces.

Year.	Nova Scotia.			Prince Edward Island.			New Brunswick.			Quebec.			Ontario.		
	Bushels.	Value.		Bushels.	Value.		Bushels.	Value.		Bushels.	Value.		Bushels.	Value.	
		\$	Average.		\$	Average.		\$	Average.		\$	Average.		\$	Average.
1906.	50,000	13,600	0.27	.....	.....	.....	405,450	94,290	0.23	923,563	201,816	0.22	2,885,000	496,785	0.17
1907.	30,000	11,100	0.37	15,000	4,900	0.33	554,330	124,786	0.23	1,053,856	262,990	0.25	2,333,879	393,474	0.17
1908.	37,500	12,000	0.32	13,568	4,102	0.30	155,748	34,262	0.22	857,700	201,357	0.23	2,087,731	358,507	0.17
1909.	37,500	11,250	0.30	20,230	5,479	0.27	697,466	154,151	0.22	1,281,827	315,633	0.25	2,619,553	434,147	0.17
1910.	40,000	8,800	0.22	15,700	4,690	0.30	470,050	105,593	0.22	1,227,555	299,126	0.23	2,988,020	476,137	0.16
1911.	618,950	123,790	0.20	20,250	6,765	0.33	613,738	132,897	0.22	1,428,392	356,453	0.25	3,360,265	538,902	0.16
1912.	684,925	136,930	0.20	24,971	8,191	0.33	616,835	133,742	0.22	1,727,614	474,595	0.27	3,376,193	573,269	0.17
1913.	851,050	170,210	0.20	3,762	1,129	0.30	392,985	98,841	0.25	1,616,446	418,008	0.26	3,254,482	573,209	0.18
1914.	516,029	103,017	0.20	.....	.....	.....	391,739	102,980	0.26	1,767,935	389,064	0.22	3,393,078	556,850	0.16
1915.	915,086	183,017	0.20	.....	.....	.....	369,117	93,797	0.25	1,351,306	274,831	0.20	1,903,914	328,515	0.17
1916.	909,800	181,960	0.20	.....	.....	.....	424,113	104,635	0.25	1,498,845	267,119	0.18	2,031,396	367,115	0.18
1917.	935,286	197,037	0.20	1,734	546	0.31	532,251	171,248	0.32	1,470,486	355,012	0.23	2,846,850	668,368	0.23
				820	287	0.35									
	Manitoba.			Saskatchewan.			Alberta.			British Columbia.			Canada.		
	Bushels.	Value.		Bushels.	Value.		Bushels.	Value.		Bushels.	Value.		Bushels.	Value.	
		\$	Average.		\$	Average.		\$	Average.		\$	Average.		\$	Average.
1906.	620,201	119,792	0.19	.....	.....	.....	240,000	56,200	0.23	106,192	26,694	0.25	5,230,406	1,009,177	0.19
1907.	431,548	84,793	0.20	.....	.....	0.40	173,040	41,225	0.24	159,963	49,847	0.31	4,755,316	974,595	0.20
1908.	138,786	24,192	0.17	.....	.....	.....	135,000	34,500	0.26	176,435	44,027	0.25	3,401,468	712,947	0.20
1909.	423,954	69,670	0.16	.....	.....	.....	125,000	67,350	0.24	231,269	75,076	0.32	5,592,924	1,132,756	0.20
1910.	606,679	100,808	0.17	.....	.....	.....	303,214	69,268	0.23	196,878	72,657	0.37	5,848,146	1,137,079	0.19
1911.	706,888	140,629	0.20	.....	.....	.....	434,088	100,407	0.23	331,014	117,756	0.34	7,533,525	1,517,599	0.20
1912.	818,237	168,237	0.21	.....	.....	0.36	704,035	166,520	0.24	517,329	181,905	0.35	8,475,839	1,844,849	0.22
1913.	576,938	107,281	0.19	.....	.....	0.29	465,250	115,355	0.25	362,571	115,365	0.32	7,558,481	1,609,398	0.21
1914.	526,167	92,898	0.18	.....	.....	.....	280,252	58,321	0.21	151,689	56,767	0.37	7,028,582	1,360,628	0.19
1915.	281,432	71,372	0.25	.....	.....	.....	74,152	14,445	0.20	132,237	49,725	0.33	5,047,244	1,015,702	0.20
1916.	355,301	83,754	0.24	.....	.....	.....	78,019	20,033	0.26	194,042	66,301	0.34	5,493,250	1,091,463	0.20
1917.	393,982	92,932	0.24	.....	.....	.....	104,540	35,516	0.34	232,955	53,067	0.25	6,567,170	1,558,487	0.24

Exports and Imports.—The value of the lime exported during the calendar year 1917 was \$74,523, as compared with exports in 1916 valued at \$66,406. The imports of lime during the calendar year 1917 were 242,998 hundredweight, or 12,149 tons, valued at \$78,251, or an average of \$6.44 per ton. The imports in 1916 were equivalent to 21,178 tons, valued at \$96,332, or an average of \$4.55 per ton.

Exports of Lime.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	\$		\$		\$		\$
1906.....	57,072	1909.....	48,821	1912.....	35,097	1915.....	15,617
1907.....	55,903	1910.....	44,762	1913.....	29,234	1916.....	66,406
1908.....	43,316	1911.....	39,536	1914.....	16,927	1917.....	74,523

Imports of Lime.

Year.	Barrels.	Value.	Average Value.	Year.	Barrels.	Value.	Average Value.
		\$	\$			\$	\$
1907.....	126,285	99,179	0.79	1913.....	386,693	238,271	0.62
1908.....	143,270	99,196	0.69	1914.....	340,828	211,123	0.62
1909.....	168,357	118,239	0.70	1915.....	189,774	98,040	0.52
1910.....	212,502	138,847	0.65	1916.....	211,780	96,332	0.46
1911.....	228,538	161,985	0.71	1917.....	121,500	78,251	0.64
1912.....	329,925	207,481	0.63				

SAND-LIME BRICK.

(By JOSEPH KEELE.)

The raw materials used in the manufacture of sand-lime brick are ordinary clean bank sand and hydrate lime, the proportion of the latter being about 6 per cent of the total weight of the mixture. The materials are thoroughly mixed by machinery and pressed into shape and submitted to steam under pressure in closed cylinders for about eight hours. The resulting bricks are light in colour and fairly hard and dense. They are much used for lining basement walls and the interior of factories. Their light colour and smoothness makes further finish on the walls unnecessary.

Sand-lime brick plants are generally located near cities so that the finished product can be conveyed by teams from the factory to the various jobs on which they are used as the less handling they receive before being laid the better the appearance in the wall.

The first record of the production of sand-lime brick in Canada was obtained for the year 1907 when there was a production by ten firms amounting to 16,492,971 brick, valued at \$167,795.

In 1917 the sales were reported at 18,001,990 valued at \$201,355, or an average of \$11.19 per thousand, as compared with sales in 1916 of 16,540,747 brick, valued at \$126,235.

Annual Production of Sand-Lime Brick.

Calendar Year.	No. of firms reporting sales.	Number sold.	Value.	Per M.
			\$	\$
1907.....	10	16,492,971	167,795	10.17
1908.....	9	17,288,260	152,856	8.84
1909.....	9	27,052,864	201,650	7.45
1910.....	13	44,593,541	371,857	8.34
1911.....	16	51,535,243	442,427	8.58
1912.....	20	96,448,402	1,020,386	10.58
1913.....	22	92,586,676	906,665	9.79
1914.....	21	70,650,030	609,515	8.63
1915.....	18	17,960,802	141,742	7.89
1916.....	15	16,540,747	126,235	7.63
1917.....	13	18,001,990	201,355	11.19

SAND AND GRAVEL.

The total sales of sand and gravel, produced in Canada during 1917, amounted to 9,182,417 tons valued at \$2,326,249, as against 8,156,207 tons valued at \$1,838,320 in 1916, an increase of \$487,929, or 26 per cent in total value.

The 1917 production included: building sand and sand for concrete and road-building, 1,505,907 tons valued at \$614,272; gravel, including sand and gravel and crushed gravel, 2,214,369 tons valued at \$904,584; railway ballast, 5,312,218 tons valued at \$718,801; moulding sand, 46,790 tons valued at \$46,018, and other sands, core sands, engine sands, etc., 103,133 tons valued at \$42,574.

Previous to 1912 no attempt had been made by this department to obtain statistics of the production of building sand or of gravel in Canada. In 1912, however, a beginning was made, the returns received showing a production valued at \$1,512,099. The increasing production during the next two or three years is no doubt due in considerable part to the greater efficiency in the collection of the record.

Production of Sand and Gravel, 1917.

Province.	Sand.		Sand and Gravel.		Ballast.		All Other.		Total.	
	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.
Nova Scotia.....	1,658	\$ 1,163	72,072	\$ 74,301	145,637	\$ 49,731	6,090	\$ 4,425	225,457	\$ 129,620
New Brunswick.....	30	6	11,880	3,636	506,491	43,420	.....	.....	518,401	47,062
Quebec.....	302,473	185,935	49,514	15,107	646,313	63,640	300	600	998,600	265,282
Ontario.....	1,115,912	381,968	962,604	365,940	2,074,558	342,868	130,092	79,276	4,283,076	1,170,052
Manitoba.....	59,495	27,378	457,834	225,346	119,273	35,254	2,200	1,103	638,802	289,081
Saskatchewan.....	21,687	15,489	14,410	7,913	907,873	88,873	.....	.....	943,970	112,275
Alberta.....	.....	.....	9,159	3,264	698,608	66,094	1,978	1,858	709,745	71,216
British Columbia.....	4,652	2,333	636,886	209,077	213,465	28,921	9,353	1,330	864,366	241,661
Total.....	1,505,907	614,272	(a) 2,214,369	904,584	5,312,218	718,801	(b) 149,923	88,592	9,182,417	2,326,249

(a) Includes 246,065 tons of gravel, valued at \$149,988.

(b) Includes 46,790 tons of moulding sand, valued at \$46,918.

Production of Sand and Gravel, 1916.

Province.	Sand.		Sand and Gravel.		Ballast.		All Other.		Total.	
	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.
Nova Scotia.....	32,719	\$ 19,620	67,563	\$ 45,262	66,000	\$ 13,800	9,289	\$ 5,949	175,571	\$ 84,631
New Brunswick.....	80	20	55,350	21,075	747,459	99,768	125	125	803,014	120,988
Quebec.....	368,915	137,905	26,335	9,336	539,365	65,597	131	46	934,746	212,884
Ontario.....	930,590	293,375	830,329	271,891	1,808,109	189,176	142,203	64,505	3,711,231	818,947
Manitoba.....	39,745	20,650	456,093	151,635	659,567	70,181	2,200	986	1,157,605	243,542
Saskatchewan.....	3,882	3,437	161,514	40,476	161,374	15,793	146	373	328,116	60,079
Alberta.....	575	230	45,723	16,708	420,034	49,620	1,168	584	467,500	67,142
British Columbia.....	2,813	574	415,993	211,147	157,178	17,254	2,440	1,222	578,424	230,197
Total.....	1,379,319	475,811	(a) 2,058,900	767,530	4,559,686	521,189	(b) 158,302	73,790	8,156,207	1,838,320

(a) Includes 553,125 tons gravel, valued at \$162,250.

(b) Includes 19,251 tons moulding sand, valued at \$16,726.

Annual Production of Sand and Gravel, 1912-1915.

Province.	1912.	1913.	1914.	1915.
	\$	\$	\$	\$
Nova Scotia.....	13,549	101,201	100,016	71,821
New Brunswick.....				19,014
Quebec.....				260,983
Ontario.....				727,426
Manitoba.....				203,666
Saskatchewan.....	255,453	236,377	222,019	38,206
Alberta.....	148,704	265,165	273,115	47,197
British Columbia.....	385,946	180,863	391,731	256,454
Total.....	1,512,099	2,258,874	2,505,310	1,624,767

Annual Exports of Sand and Gravel.

Calendar Year.	Short Tons.	Value.	Average per Ton.	Calendar Year.	Short Tons.	Value.	Average per Ton.
		\$	\$			\$	\$
1908.....	298,954	161,387	0.54	1913.....	644,633	440,956	0.68
1909.....	481,584	256,166	0.53	1914.....	952,370	802,358	0.84
1910.....	624,824	407,974	0.65	1915.....	808,022	380,549	0.47
1911.....	573,494	408,110	0.71	1916.....	1,114,913	388,309	0.35
1912.....	660,090	459,952	0.70	1917.....	1,075,374	290,964	0.27

Annual Imports of Sand and Gravel.

Calendar Year.	Tons.	Value.	Average Value.	Calendar Year.	Tons.	Value.	Average Value.
		\$	\$			\$	\$
1907.....	265,912	223,968	0.84	1913.....	439,673	440,343	1.00
1908.....	133,665	135,348	1.01	1914.....	273,812	224,759	0.82
1909.....	151,323	153,778	1.02	1915.....	199,597	120,756	0.60
1910.....	195,796	196,766	1.00	1916.....	233,777	183,894	0.79
1911.....	241,375	246,613	1.02	1917.....	328,520	312,403	0.95
1912.....	532,721	445,781	0.84				

SLATE.

There is a small annual production of slate in Canada, obtained from the New Rockland quarries, Melbourne township, Richmond county, operated by The New Rockland Slate Co., Ltd.

The production in 1917 was 1,422 squares valued at \$7,789, as compared with the production in 1916 of 1,262 squares valued at \$6,223.

Annual Production of Slate.

Calendar Year.	Quantity.	Value.	Calendar Year.	Quantity.	Value.
		\$			\$
1886*	5,345	64,675	1902		19,200
1887	7,357	89,000	1903*	5,510	22,040
1888	5,314	90,689	1904	5,277	23,247
1889	6,935	119,160	1905		21,568
1890	6,368	100,250	1906		24,446
1891	5,000	65,000	1907	4,335	20,056
1892	5,180	69,070	1908	2,950	13,496
1893	7,112	90,825	1909	4,000	19,000
1894		75,550	1910	3,959	18,492
1895		58,900	1911	1,833	8,248
1896		53,370	1912	1,894	8,939
1897		42,800	1913	1,432	6,444
1898		40,791	1914	1,075	4,837
1899		33,406	1915	397	2,039
1900		12,100	1916	1,262	6,223
1901		9,980	1917	1,422	7,789

* From 1903, in squares; previously, in tons.

No exports of slate have been reported since 1886 with the exception of the years 1908 and 1909.

The imports of slate during the past twelve years have ranged in value from \$90,000 to over \$200,000 per annum.

The total value of the imports during the calendar year 1917 was \$106,893, and included: roofing slate, 3,909 squares valued at \$20,785; school writing slate, valued at \$40,603; slate pencils, \$8,717, and other slates and manufactures of, \$36,788.

Imports of Slate during the Years 1913 to 1917.

Slate and manufactures of	1913.	1914.	1915.	1916.	1917.
	\$	\$	\$	\$	\$
Roofing slate	97,730	91,977	34,525	21,335	20,785
School writing slate	51,953	54,723	38,874	35,887	40,603
Slate pencils	9,166	6,514	4,954	11,309	8,717
Slate of all kinds and manufactures of	76,625	59,444	30,320	28,245	36,788
Mantles		598			
	235,474	213,256	108,676	96,776	106,893

Imports of Slate.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	\$		\$		\$		\$
1907	134,063	1910	142,285	1913	235,474	1916	96,776
1908	120,282	1911	169,685	1914	213,256	1917	106,893
1909	135,221	1912	200,643	1915	108,676		

STONE.¹

Statistics of stone production given herewith include the sales of all classes of stone used for building, monumental, and ornamental purposes, stone for paving purposes, curbstone and flagstone, rubble, riprap, and crushed stone, limestone for furnace flux, sugar factories, etc., but stone used for burning lime or manufacturing cement is not included.

The kinds of stone quarried have been classed as granite (including trap rock, syenite, and other igneous rocks), limestone, sandstone, and marble.

The records are practically confined to quarry operations, and to the production of sawn or polished stone when these operations are carried on by quarry operators. In addition to this production of stone by regular operators, there is no doubt a large stone production by individuals, such as farmers, and others, for house or barn foundations, concrete work, etc., of which it would be impracticable to obtain any satisfactory record. Much stone is also used in railway construction work and in road building, of which the record is probably very incomplete.

The total value of the production of stone during 1917, according to returns received, was \$3,240,147, as compared with a value of \$3,736,412 in 1916, showing a falling off of \$496,265, or about 13 per cent.

The number of active firms reported in 1917 was 165, the total number of men employed 3,002, and total wages paid \$1,610,598.

Of the total value of the production in 1917, limestone contributed \$2,283,659, or 70.5 per cent; granite \$639,412, or 19.7 per cent; sandstone \$261,256, or 8.1 per cent, and marble \$55,820, or 1.7 per cent.

Production of Stone by Provinces, 1917.

Province.	Granite.	Limestone.	Marble.	Sandstone.	Total.	%	Labour.	
							No. men employed.	Wages.
	\$	\$	\$	\$	\$			\$
Nova Scotia.....	111,529	433,987	.....	24,005	569,521	17.6	532	300,204
New Brunswick.....	61,170	22,875	.....	27,105	111,150	3.4	159	43,232
Quebec.....	281,242	625,711	55,820	28,820	991,593	30.6	1,172	499,515
Ontario.....	119,301	808,638	.....	64,516	992,455	30.6	721	470,674
Manitoba.....	.....	301,968	.....	.....	301,968	9.3	257	148,504
Alberta.....	.....	672	.....	6,810	7,482	0.3	6	2,100
British Columbia.....	66,170	89,808	.....	110,000	265,978	8.2	155	146,368
Total.....	639,412	2,283,659	55,820	261,256	3,240,147		3,002	1,610,598
Per cent....	19.7	70.5	1.7	8.1		100.0		

¹ A special investigation has been undertaken by the Mines Branch on the building and ornamental stones of Canada, by Prof. W. A. Parks, of Toronto University, and five reports of this series have been completed as follows:—

No. 100.—“The Building Stones of Canada, Vol. I : Building and Ornamental Stones of Ontario”.

No. 203.—“Building Stones of Canada, Vol. II : Building and Ornamental Stones of the Maritime Provinces”.

No. 279.—“Building Stones of Canada, Vol. III : Building and Ornamental Stones of the Province of Quebec”.

No. 388.—“Building Stones of Canada, Vol. IV : Building and Ornamental Stones of the Provinces of Manitoba, Saskatchewan, and Alberta.”

No. 452.—“Building Stones of Canada, Vol. V : Building and Ornamental Stones of the Province of British Columbia”, (1917).

Production of Stone by Provinces, 1916.

Province.	Granite.	Lime- stone.	Marble.	Sand- stone.	Total.	%	Labour.	
							No. men em- ployed.	Wages.
	\$	\$	\$	\$	\$			\$
Nova Scotia.....	164,870	263,803	.....	30,625	459,298	12.3	580	319,983
New Brunswick.....	59,325	6,900	.....	46,032	112,257	3.0	135	52,046
Quebec.....	422,297	799,354	118,810	30,004	1,370,465	36.7	1,729	790,512
Ontario.....	135,826	688,114	.....	33,083	857,023	22.9	864	439,981
Manitoba.....	.....	372,894	.....	.....	372,894	10.0	288	198,807
Alberta.....	.....	257	.....	.....	257	.....	.....	.....
British Columbia.....	464,949	92,769	.....	6,500	564,218	15.1	424	313,991
Total.....	1,247,267	2,224,091	118,810	146,244	3,736,412	.....	4,020	2,115,320
Per cent.....	33.4	59.5	3.2	3.9	.....	100.0	.....	.....

Production of Stone by Kinds and by Provinces Showing Purposes Used, 1917.

By kinds.	Building.	Ornamental and monumental.	Paving and curbstone.	Rubble.		Crushed.		Furnace Flux.		Total Value.
				Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.	
	\$	\$	\$		\$		\$		\$	\$
Granite.....	194,402	129,069	44,258	43,229	32,588	320,958	239,095			639,412
Limestone.....	487,820	3,099	5,501	30,769	23,117	1,084,851	985,256	814,334	772,866	2,283,652
Marble.....	55,000					120	660	160	160	55,820
Sandstone.....	152,795		7,475	42,491	45,076	28,443	55,910			261,266
By Provinces.										
Nova Scotia.....	59,869	21,172	150	24,655	21,414	30,228	46,250	417,725	420,666	569,521
New Brunswick.....	5,270	46,802	800	23,696	25,855	11,668	23,348	2,250	9,075	111,150
Quebec.....	340,385	58,399	20,849	4,273	3,763	460,236	557,087	660	560	991,593
Ontario.....	76,696	4,595	25,435	25,025	23,988	855,517	599,854	303,877	261,917	992,455
Manitoba.....	290,172			3,100	2,568	12,516	9,228			301,968
Alberta.....	4,800			1,650	2,010	960	672			7,482
British Columbia.....	112,275	1,200		34,090	27,213	63,247	44,482	89,982	80,808	265,978
Total.....	890,017	132,168	(a) 57,234	116,489	106,781	1,434,372	1,280,921	814,494	773,026	3,240,147
Per cent.....	27.5	4.1	1.7		3.3		39.5		23.9	100.00

(a) Of which 39,532 are paving blocks.

Production of Stone by Kinds and by Provinces Showing Purposes Used, 1916.

252

By kinds.	Building.	Ornamental and monumental.	Paving and curbstone.	Rubble.		Crushed.		Furnace Flux.		Total Value.
				Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.	
	\$	\$	\$		\$		\$		\$	\$
Granite.....	507,139	75,577	67,476	396,203	299,910	424,873	297,165			1,247,267
Limestone.....	629,650	3,138	1,673	104,049	60,161	1,387,235	1,049,219	824,110	480,230	2,224,091
Marble.....		103,400				27,434	15,410			118,810
Sandstone.....	36,853	951	8,190	74,677	53,629	29,772	46,721			146,244
By Provinces.										
Nova Scotia.....	107,202	1,586	5,515	76,652	62,342	13,970	22,510	465,831	260,143	459,298
New Brunswick.....	6,970	55,745	1,230	58,428	41,412	2,300	6,900			112,257
Quebec.....	445,031	119,239	49,716	48,020	32,393	800,407	724,026			1,370,465
Ontario.....	70,734	6,416	20,878	60,754	29,480	977,113	602,197	188,820	127,318	857,623
Manitoba.....	358,112			5,732	4,876	14,026	9,906			372,894
Alberta.....							257			257
British Columbia.....	185,533	100		325,343	243,097	60,891	42,719	169,459	92,769	564,218
Total.....	1,173,642	183,056	77,339	574,929	413,600	1,869,344	1,408,515	824,110	480,230	3,736,412
Per cent.....	31.4	4.9	2.0		11.1		37.7		12.9	

Exports and Imports.—The exports of stone from Canada in 1917 were valued at \$126,882, as against a value of \$143,988 in 1916. The principal item in the export of stone during the past few years has been building stone, unwrought, of which the exports in 1917 were 139,153 tons valued at \$122,430. There was also an export of ornamental granite, marble, etc., unwrought, of 330 tons valued at \$359; crushed stone 2,308 tons, valued at \$2,277, and dressed stone of all kinds valued at \$1,816.

The exports of the several classes of stone during the past three years as shown by the Customs record was as follows:—

Exports of Stone during the Calendar Years 1915, 1916, and 1917.

	1915.		1916.		1917.	
	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.
		\$		\$		\$
Crushed	42,716	24,453	26,754	27,611	2,308	2,277
Ornamental, granite, marble, etc., unwrought.....	29,976	12,764	15,967	7,989	330	359
Building, freestone, limestone, etc., unwrought.....	35,804	28,910	128,453	103,796	139,153	122,430
Stone of all kinds, dressed.....		6,650		4,592		1,816
		72,777		143,988		126,882

Exports of Stone and Marble, Wrought and Unwrought.

Calendar Year.	Wrought.	Unwrought.	Calendar Year.	Wrought.	Unwrought.
1908.....	\$15,194	\$36,820	1913.....	\$7,881	\$86,459
1909.....	33,598	24,087	1914.....	2,122	69,958
1910.....	5,352	22,219	1915.....	6,650	66,127
1911.....	1,436	26,899	1916.....	4,592	139,396
1912.....	2,621	30,621	1917.....	1,816	125,066

The imports of stone are classified as: building stone of all kinds, except marble; refuse; manufactures of granite and other stone; and marble and its manufactures.

The total value of the imports during the calendar year 1917 was \$764,658, as compared with a value of \$587,304 in 1916.

Details of imports are shown in the following tables:—

Total Imports of Stone during the Calendar Years 1916 and 1917.

Imports.	1916.		1917.	
	Short Tons.	Value.	Short Tons.	Value.
		\$		\$
¹ Building stone, rough.....		68,939		113,008
² Building stone, dressed.....		43,410		63,125
³ Refuse stone.....	363,682	169,877	497,709	256,182
Granite, sawn only.....		5,049		3,189
Granite, manufactures of.....		91,939		80,299
Manufactures of stone, n.o.p.....		36,241		49,157
Marble and manufactures of—				
Marble, sawn or sand rubbed, not polished.....		92,414		121,644
Marble, rough, not hammered or chiselled.....		35,792		24,553
Marble, manufactures of, n.o.p.....		43,643		53,500
		587,304		764,658

¹ Flagstone, granite, rough sandstone, and all building stone not hammered, sawn, or chiselled.

² Flagstone and all other building stone, sawn, or dressed, or partially dressed.

³ Stone refuse not sawn, hammered, or chiselled, not fit for flagstone, building stone, or paving.

Annual Imports of Stone.

Calendar Year.	Building Stone.		Manufactures of granite, etc., paving blocks.	Marble.	Refuse stone.	Total value.
	Rough.	Dressed.				
						\$
1907.....	\$73,140	\$85,683	\$161,250	\$254,897	\$79,371	\$654,341
1908.....	64,607	72,575	196,717	245,448	34,746	614,093
1909.....	102,470	178,087	221,097	182,147	54,428	738,229
1910.....	125,531	186,064	266,313	267,215		845,123
1911.....	85,084	307,784	272,512	384,252	91,214	1,140,846
1912.....	117,037	451,635	309,386	475,926	113,159	1,467,143
1913.....	105,576	464,540	302,398	577,028	191,307	1,640,849
1914.....	72,147	252,563	240,015	465,563	222,581	1,252,869
1915.....	54,249	57,761	180,188	152,454	94,521	539,173
1916.....	68,939	43,410	133,229	171,849	169,877	587,304
1917.....	113,008	63,126	132,645	199,697	256,182	764,658

GRANITE.

The production of granite including traprock, syenite, etc., during 1917, according to returns received from 47 active firms, was valued at \$639,412, as compared with a production in 1916 valued at \$1,247,267.

Value of Granite Production by Provinces, 1917.

Province.	Build- ing.	Monu- mental or orna- mental.	Curb or paving.	Rubble and riprap.		Crushed.		Total value.
				Short tons.	Value.	Short tons.	Value.	
	\$	\$	\$		\$		\$	\$
Nova Scotia.....	52,536	21,172	150	7,983	4,742	21,467	32,929	111,529
New Brunswick.....	3,900	46,802	800	300	120	7,068	9,548	61,170
Quebec.....	134,805	58,095	23,278	856	513	44,874	64,551	281,242
Ontario.....	886	1,800	20,030			187,302	96,585	119,301
British Columbia.....	2,275	1,200		34,090	27,213	60,247	35,482	66,170
Total.....	194,402	129,069	44,258	43,229	32,588	320,958	239,095	639,412

Value of Granite Production by Provinces, 1916.

Province.	Build- ing.	Monu- mental or orna- mental.	Curb or paving.	Rubble and riprap.		Crushed.		Total value.
				Short tons.	Value.	Short tons.	Value.	
	\$	\$	\$		\$		\$	\$
Nova Scotia.....	97,750	785	5,515	62,350	49,470	7,750	11,350	164,870
New Brunswick.....		(¹) 55,595	1,230	450	2,500			59,325
Quebec.....	230,356	15,537	41,226	8,050	4,825	138,305	130,353	422,297
Ontario.....		3,560	19,505	10	18	217,927	112,743	135,826
British Columbia.....	157,033	100		325,343	243,097	60,891	42,719	464,949
Total.....	507,139	75,577	67,476	396,203	299,910	424,873	297,165	1,247,267

(¹) Finished stone was produced at St. George to the value of \$113,745.

Annual Production of Granite.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	\$		\$		\$		\$
1886.....	63,309	1894.....	109,936	1902.....	210,000	1910.....	739,516
1887.....	142,506	1895.....	84,838	1903.....	200,000	1911.....	1,119,865
1888.....	147,305	1896.....	106,709	1904.....	150,000	1912.....	1,373,119
1889.....	79,624	1897.....	61,934	1905.....	226,305	1913.....	1,653,791
1890.....	65,985	1898.....	81,073	1906.....	278,419	1914.....	2,176,602
1891.....	70,056	1899.....	90,542	1907.....	194,712	1915.....	1,525,553
1892.....	89,326	1900.....	80,009	1908.....	282,320	1916.....	1,247,267
1893.....	94,393	1901.....	155,000	1909.....	454,824	1917.....	639,412

LIMESTONE.

The statistics given herewith do not include the value of the stone burned into lime by the quarry operators, nor that of the stone used in the manufacture of cement, a record of lime and cement production being separately given. With these exceptions the total value of limestone produced in Canada in 1917 was \$2,283,659, as compared with a value of \$2,224,091 in 1916.

Limestone Production by Provinces, 1917.

Province.	Building and ornamental.	Curb-stone and paving stone.	Rubble and riprap.		Crushed.		Furnace flux.		Total value.
			Short tons.	Value.	Short tons.	Value.	Short tons.	Value.	
	\$	\$		\$		\$		\$	\$
Nova Scotia....					8,761	13,321	417,725	420,666	433,987
New Brunswick.					4,600	13,800	2,250	9,075	22,875
Quebec.....	151,434	96	3,417	3,250	405,560	470,531	500	400	625,711
Ontario.....	49,313	5,405	24,252	23,299	649,454	468,704	303,877	261,917	808,638
Manitoba.....	290,172		3,100	2,568	12,516	9,228			301,968
Alberta.....					960	672			672
British Columbia					3,600	9,000	89,982	80,808	89,808
Total	490,919	5,501	30,769	29,117	1,084,851	985,256	814,334	772,866	2,283,659

Limestone Production by Provinces, 1916.

Province.	Building and ornamental.	Curb-stone and paving stone.	Rubble and riprap.		Crushed.		Furnace flux.		Total value.
			Short tons.	Value.	Short tons.	Value.	Short tons.	Value.	
	\$	\$		\$		\$		\$	\$
Nova Scotia....					1,220	3,660	465,831	260,143	263,803
New Brunswick.					2,300	6,900			6,900
Quebec.....	215,037	300	39,970	27,568	621,987	556,449			799,354
Ontario.....	59,659	1,373	58,347	27,717	747,065	472,047	188,820	127,318	688,114
Manitoba.....	358,112		5,732	4,876	14,020	9,966	169,459		372,894
Alberta.....					643	257			257
British Columbia								92,769	92,769
Total	632,808	1,673	104,049	60,161	1,387,235	1,049,219	824,110	480,230	2,224,091

Production of Limestone by Provinces, 1910-1915.

Province.	1910.	1911.	1912.	1913.	1914.	1915.
	\$	\$	\$	\$	\$	\$
Nova Scotia.....	192,919	245,216	275,944	258,719	94,239	255,024
New Brunswick.....	315	110				
Quebec.....	962,429	1,296,577	1,187,751	1,307,428	1,326,943	1,189,633
Ontario.....	722,763	680,461	862,052	1,196,130	853,906	634,728
Manitoba.....	328,029	315,782	381,572	382,984	346,258	153,113
Alberta.....				20,000		
British Columbia.....	43,121	56,780	55,617	38,830	51,435	79,583
Total.....	2,249,576	2,594,926	2,762,936	3,204,091	2,672,781	2,312,081

MARBLE.

From 1886 to 1896 there was a small production of marble, aggregating, however, only \$45,837 in value for the eleven years. During the next eleven years—1897 to 1907—there is no record of any production, but the opening of the quarries at Philipsburg, and South Stukely, Que., together with the development of quarries in Ontario and British Columbia, has resulted in a considerable production of marble during the past nine years. The total value of the production in 1917 was returned as \$55,820, comprising ornamental marble, 1,210 tons, valued at \$55,000, and crushed marble, 280 tons, valued at \$820. The production in 1916 was valued at \$118,810, comprising ornamental marble, 1,034 tons, valued at \$103,400, and crushed marble, 27,464 tons, valued at \$15,410.

Annual Production of Marble.

Calendar year.	Short tons.	Value.	Calendar year.	Short tons.	Value.
		\$			\$
1886.....	501	9,900	1897 to 1907 inclusive....	Nil.	Nil.
1887.....	242	6,224	1908.....		125,000
1888.....	191	3,100	1909.....		158,441
1889.....	83	980	1910.....		158,779
1890.....	780	10,776	1911.....		162,783
1891.....	240	1,752	1912.....		260,764
1892.....	240	3,600	1913.....		249,975
1893.....	590	5,100	1914.....		132,533
1894.....	Nil.	Nil.	1915.....		158,027
1895.....	200	2,000	1916.....	28,498	118,810
1896.....	224	2,405	1917.....	1,490	55,820

The imports of marble during the calendar year 1917 were valued at \$199,697, as compared with \$171,849 in 1916.

The annual imports of marbles are shown in the general table of imports.

SANDSTONE.

The value of the production of sandstone during 1917 is reported as \$261,256, as compared with a value of \$146,244 in 1916. A large portion of the sandstone is quarried for building purposes, though considerable quantities are used for rubble and for paving.

There is included in the production of sandstone the output of several quarries containing a stone very high in silica and comparatively free from iron oxide, the product being shipped in a crushed or ground form and used for the manufacture of glass, for steel foundry work, or for the manufacture of ferro-silicon. The total shipments of this crushed sandstone in 1917 were 28,443 tons, valued at \$55,910, derived from quarries at Nelles Corners, Haldimand county, Ontario; Cascades Point, Vaudreuil, Que.; Melochville, Beauharnois, Que. A similar quarry has also been opened up during 1918 at St. Canute, county of Two Mountains, Que.

Value of Sandstone Production by Provinces, 1917.

Province.	Building and ornamental.	Paving.	Rubble and riprap.		Crushed.		Total value.
			Short tons.	Value.	Short tons.	Value.	
	\$	\$		\$		\$	\$
Nova Scotia.....	7,333	.....	16,672	16,672	.....	.....	24,005
New Brunswick.....	1,370	.....	23,396	25,735	.....	.....	27,105
Quebec.....	.....	7,475	.....	.....	9,682	21,345	28,820
Ontario.....	29,292	.....	773	659	18,761	34,565	64,516
Alberta.....	4,800	.....	1,650	2,010	.....	.....	6,810
British Columbia.....	110,000	.....	.....	.....	.....	.....	110,000
Total	152,795	7,475	42,491	45,076	28,443	55,910	261,256

Value of Sandstone Production by Provinces, 1916.

Province.	Building and ornamental.	Paving.	Rubble and riprap.		Crushed.		Total value.
			Short tons.	Value.	Short tons.	Value.	
	\$	\$		\$		\$	\$
Nova Scotia.....	10,253	.....	14,302	12,872	5,000	7,500	30,625
New Brunswick.....	7,120	.....	57,978	38,912	.....	.....	46,032
Quebec.....	.....	8,190	.....	.....	12,651	21,814	30,004
Ontario.....	13,931	.....	2,397	1,745	12,121	17,407	33,083
British Columbia.....	6,500	.....	.....	.....	.....	.....	6,500
Total	37,804	8,190	74,677	53,529	29,772	46,721	146,244

Value of Sandstone Production by Provinces, 1910-1915.

Province.	1910.	1911.	1912.	1913.	1914.	1915.
	\$	\$	\$	\$	\$	\$
Nova Scotia.....	16,425	23,440	20,645	62,490	61,124	33,264
New Brunswick.....	51,793	35,337	68,260	70,787	236,647	145,177
Quebec.....	.....	450	.....	.....	17,000	36,417
Ontario.....	62,247	54,032	59,240	54,738	59,923	19,588
Alberta.....	240,858	158,344	81,391	136,984	60,272	890
British Columbia.....	130,825	179,580	99,816	71,783	51,774	14,000
Total.....	502,148	451,183	329,352	396,782	487,140	249,336

CANADA

DEPARTMENT OF MINES

HON. MARTIN BURRELL, MINISTER; R. G. McCONNELL, DEPUTY MINISTER.

-D-28

MINES BRANCH

EUGENE HAANEL, PH.D., DIRECTOR.

ANNUAL REPORT

ON THE

MINERAL PRODUCTION OF CANADA

During the calendar Year

1918



OTTAWA

J. DE LABROQUERIE TACHÉ

PRINTER TO THE KING'S MOST EXCELLENT MAJESTY

1919

CANADA
DEPARTMENT OF MINES
HON. MARTIN BURRELL, MINISTER; R. G. McCONNELL, DEPUTY MINISTER.

MINES BRANCH
EUGENE HAANEL, PH.D., DIRECTOR.

ANNUAL REPORT

ON THE

MINERAL PRODUCTION OF CANADA

During the calendar Year

1918



OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1919

LETTER OF TRANSMITTAL.

Dr. EUGENE HAANEL,
Director of Mines Branch,
Department of Mines,
Ottawa.

SIR,—I beg to hand you, herewith, the Annual Report on the Mineral Production of Canada, giving revised statistical information descriptive of the mining and metallurgical production in Canada during the calendar year 1918.

A preliminary report on the mineral production during 1918 was sent to press February 27, 1919, and issued within the following week.

During the five months immediately following the 10th March, 1919, the greater part of the time of the undersigned was taken up with the duties of the Acting Directorship of the Mines Branch. On this account, and in order to facilitate the more prompt publication of the final, complete mineral production record, this report is submitted in greatly abbreviated form.

Separate reports dealing more completely with the production of coal and coke, iron and steel, and possibly other metals and ores will be prepared but will not be included as usual in the annual volume.

That section of this report dealing with metals and metalliferous ores, except iron and steel, has been prepared by Mr. A. Buisson; and the entire section dealing with non-metalliferous products, including structural materials, has been prepared by Mr. John Casey.

The co-operation of Canadian mine and smelter operators who have, almost without exception, cheerfully furnished the department with statistics and information regarding their operations is gratefully acknowledged. Thanks are due also to railway and other transportation companies and to smelter operators outside of Canada for data furnished.

I have the honour to be, Sir,

Your obedient servant,

(Signed) JOHN McLEISH.

DIVISION OF MINERAL RESOURCES AND STATISTICS,

July 28, 1919.

CONTENTS.

	PAGE.
LETTER OF TRANSMITTAL..	3
EXPLANATORY NOTES—	
Definition of the terms 'ton' and 'year' used..	7
Basis of valuation and compilation..	7
MINERAL PRODUCTION OF CANADA—	
GENERAL SUMMARY—	
Mineral production in Canada, 1917 and 1918, comparative table..	11
General table of exports and imports..	15
Production by provinces, 1917 and 1918..	21
Mine production..	27
METALLIC PRODUCTS.	
ALUMINIUM..	34
ANTIMONY..	34
COBALT..	35
COPPER..	36
GOLD..	37
IRON AND STEEL—	
Iron ore..	38
Pig-iron..	38
Steel..	39
LEAD..	40
MERCURY..	41
MOLYBDENUM..	41
NICKEL..	41
PLATINUM..	42
SILVER..	43
TIN..	43
TUNGSTEN..	44
ZINC..	44
NON-METALLIC PRODUCTS.	
ABRASIVE MATERIALS—	
Corundum..	45
Grindstones..	45
Tripolite..	46
ACTINOLITE..	46
ARSENIC..	47
ASBESTOS..	47
BARYTES..	49
CHROMITE..	49
COAL..	50
COKE..	52
FELDSPAR..	54
FLUORSPAR..	54

GRAPHITE.....	55
GYP SUM.....	56
MAGNESITE.....	57
Metallic magnesium.....	57
Magnesium sulphate.....	57
MANGANESE.....	58
MICA.....	59
MINERAL PIGMENTS, IRON OXIDES.....	59
MINERAL WATER.....	60
NATURAL GAS.....	61
PEAT.....	62
PETROLEUM.....	62
PHOSPHATE.....	66
PYRITES.....	67
Sulphuric acid.....	68
QUARTZ.....	68
SALT.....	69
TALC.....	70

STRUCTURAL MATERIALS AND CLAY PRODUCTS.

CEMENT.....	71
CLAY PRODUCTS.....	72
LIME.....	76
SAND-LIME BRICK.....	76
SAND AND GRAVEL.....	77
SLATE.....	77
STONE.....	78

EXPLANATORY NOTES.

The term "ton" used throughout this report signifies a ton of 2,000 pounds; while the year referred to means calendar year, unless otherwise stated. The Government fiscal year formerly ended on the 30th June; but now terminates on the 31st March. This change took place in 1907, hence the fiscal period ending March 31, 1907, covers only nine months.

Statistics of exports and imports given throughout this report are compiled from the reports of the Trade of Canada, collected by the Customs Department and published by the Department of Trade and Commerce.

The term "production" used throughout this report may in general be interpreted as meaning the quantity sold or shipped. Mineral products mined or manufactured, but not sold or shipped at the end of the year, are not included as "production." An exception to this usage will be found in reference to pig-iron, in which case the statistics of production represent the quantities made.

The value of the metallic minerals produced, whether refined in Canada or not, is calculated on the basis of the average price of the metal in some recognized market. New York prices have usually been taken as the standard, except in the case of lead, for which the Montreal price is now used. The value of non-metallic products is given as at the mine or point of shipment.

THE

MINERAL PRODUCTION OF CANADA

During the Calendar Year

1918.

A preliminary report on the mineral production of Canada in 1918 was published on February 27, 1919, the statistical record being at that time partially estimated and therefore subject to revision.

According to the revised statement now presented the total value¹ in 1918 was \$211,301,897. This is a million dollars in excess of the total value estimated in the preliminary report.

Compared with the total value of the production in 1917 which was \$189,646,821 that of 1918 shows an increase of 11.4 per cent and in point of value represents the largest on record.

The detailed comparative statement here presented shows the production of each important product during the past two years, the proportion which each contributes to the total production, and the increase or decrease as the case may be of the production in 1918 as compared with that of 1917.

The total value of the metallic production in 1918 was \$114,549,152 as against a value of \$106,455,147 in 1917, and \$106,319,365 in 1916, showing a net increase of \$8,094,005 or 7.6 per cent in 1918 over the previous year.

The total value of the production of non-metallic products in 1918 was \$96,752,745 as against \$83,191,674 in 1917 and \$70,882,169 in 1916. The value of non-metallic products in 1918 was greater than that of any previous year. Much of this increase is to be credited to higher prices realized for most of these products though on the other hand important increases have been made in the quantities of certain war minerals produced including asbestos, chromite, and pyrites.

The total value of the production in 1886 was \$10,221,255, or about \$2.23 per capita. In ten years the value had increased to \$22,474,256, or \$4.38 per capita, more than twice the total in 1886, and nearly twice the production per capita. The next ten years witnessed an increase to \$79,286,697 in 1906, or \$12.81 per capita, about 3½ times the production in 1896. The total in 1918 was about 2½ times as large as that of 1906.

The record of annual mineral production in Canada since 1886 and the total annual production of metallic and non-metallic products since 1907 are shown in the following tables:—

¹In presenting a total valuation of the mineral production as is here given, it should be explained that the production of the metals, copper, gold, lead, nickel, silver, and zinc, is given as far as possible on the basis of the quantities of metals recovered in smelters, and the total quantities in each case are valued at the average market price of the refined metal in a recognized market. There is thus included in some cases the values that have accrued in the smelting or refining of metals outside of Canada.

Annual Mineral Production in Canada since 1886.

Year.	Value of production.	Value per capita.	Year.	Value of production.	Value per capita.
	\$	\$		\$	\$
1886.....	10,221,255	2·23	1903.....	61,740,513	10·83
1887.....	10,321,331	2·23	1904.....	60,082,771	10·27
1888.....	12,518,894	2·67	1905.....	69,078,999	11·49
1889.....	14,013,113	2·96	1906.....	79,286,697	12·81
1890.....	16,763,353	3·50	1907.....	86,865,202	13·75
1891.....	18,976,616	3·92	1908.....	85,557,101	13·16
1892.....	16,623,415	3·39	1909.....	91,831,441	13·70
1893.....	20,035,082	4·04	1910.....	106,823,623	14·93
1894.....	19,931,158	3·98	1911.....	103,220,994	14·42
1895.....	20,505,917	4·05	1912.....	135,048,296	18·27
1896.....	22,474,256	4·38	1913.....	145,634,812	18·77
1897.....	28,485,023	5·49	1914.....	128,863,075	15·96
1898.....	38,412,431	7·32	1915.....	137,109,171	17·29
1899.....	49,234,005	9·27	1916.....	177,201,534	21·77
1900.....	64,420,877	12·04	1917.....	189,646,821	22·68
1901.....	65,797,911	12·16	1918.....	211,301,897	24·59
1902.....	63,231,836	11·36			

Annual Values of Metallic and Non-Metallic Production.

Year.	Metallic.	Non-Metallic.		Total.
		Fuels and other non- metallics.	Structural or clay and stone quarry products.	
	\$	\$	\$	\$
1907.....	42,426,607	31,275,546	12,863,049	(a) 86,865,202
1908.....	41,774,362	32,142,784	11,339,955	(a) 85,557,101
1909.....	44,156,841	31,141,251	16,533,349	91,831,441
1910.....	49,438,873	37,757,158	19,627,592	106,823,623
1911.....	46,105,423	34,405,960	22,709,611	103,220,994
1912.....	61,172,753	45,080,674	28,794,869	135,048,296
1913.....	66,361,351	48,463,709	30,809,752	145,634,812
1914.....	59,386,619	43,467,229	26,009,227	128,863,075
1915.....	75,814,841	43,373,571	17,920,759	137,109,171
1916.....	106,319,365	53,414,983	17,467,186	177,201,534
1917.....	106,455,147	63,354,363	19,837,311	189,646,821
1918.....	114,549,152	77,621,946	19,130,799	211,301,897

(a) Total includes \$300,000 allowed for products not reported.

The production of pig-iron given in the general table includes only that proportion of the output of Canadian blast furnaces credited to Canadian ores. There is an important production of pig-iron from imported ores (shown in the footnotes to the general table and in the chapter on iron and steel) and the total value thereof in 1918 was exceeded only by the production of coal and nickel. There is also a large production of aluminium from imported ores for which no value is included, in the general table of production.

Comparative Statement of Mineral Production for Years 1917 and 1918.

Product.	1917.				1918.				Increase (+) or Decrease (-).		Increase (+) or Decrease (-).	
	Quantity.	Value (a).	Per Cent of Total.	Quantity.	Value (a).	Per Cent of Total.	Quantity.	%	Value.	%		
<i>Metallic.</i>												
Antimony ore *.....	361	22,000	0.91	1,347,544	3,368,860	1.59	361	100.0	—	22,000	100.0	
Cobalt metallic and contained in oxide..	1,079,572	1,727,315	15.65	118,769,989	29,250,536	13.84	267,972	24.8	+	1,641,545	96.0	
Copper (b).....	109,227,332	29,687,989	8.05	689,681	14,463,689	6.85	9,542,102	8.7	+	437,453	1.5	
Gold.....	738,831	15,272,992	0.41	47,444	1,204,703	0.57	39,150	5.3	—	809,403	5.3	
Iron, pig, from Canadian ore (c).....	46,022	768,783	0.31	118,472	498,999	0.24	1,422	3.1	+	435,920	56.7	
Iron ore sold for export (b).....	169,252	590,696	0.31	51,398,002	4,754,315	2.25	50,780	30.0	+	91,697	15.5	
Lead (d).....	32,576,281	3,628,020	1.91	378,029	434,733	0.21	18,821,721	57.8	+	1,126,295	31.0	
Molybdenite.....	288,705	288,705	0.15	92,507,293	37,002,917	17.51	89,324	30.9	+	146,028	50.6	
Nickel (e).....	82,330,280	33,732,112	17.79	39	2,560	9.79	10,177,013	12.4	+	3,270,805	9.7	
Platinum.....	57	3,822	9.54	21,383,979	20,693,704	9.79	18	51.6	—	1,263	33.0	
Silver (f).....	22,221,274	18,091,895	1.39	27,088	11,700	0.35	837,295	3.8	+	2,601,809	14.4	
Tungsten concentrates.....	29,668,764	2,640,817	56.13	35,083,175	2,862,436	1.35	27,088	18.2	+	11,700	8.4	
Zinc.....	.....	.....	.....	.....	.....	.....	5,414,411	.....	+	221,619	.....
Total.....	.....	106,455,147	.....	.....	114,549,152	54.21	.....	.....	+	8,094,005	7.6
<i>Non-metallic.</i>												
Actinolite.....	120	1,320	.....	228	2,508	.....	108	96.0	+	1,188	90.0
Arsenic, white and in ore.....	2,936	660,431	0.35	3,560	563,639	0.27	624	21.3	+	105,752	15.8	
Asbestos.....	135,502	7,183,099	3.79	141,462	8,936,804	4.23	5,960	4.4	+	1,753,705	24.4	
Asbestic.....	18,279	47,284	0.26	16,797	33,993	.....	1,482	8.1	+	13,291	28.1
Chromite.....	36,725	499,682	0.26	21,994	867,122	0.41	14,731	40.1	+	367,440	73.5	
Coal.....	14,046,759	43,199,831	22.78	14,977,926	55,192,896	26.12	931,167	6.6	+	11,993,065	27.8	
Corundum.....	188	32,153	.....	137	26,112	.....	51	27.1	+	6,041	18.8
Feldspar.....	19,462	89,826	.....	18,782	112,728	.....	680	3.5	+	22,902	25.4
Fluorspar.....	4,249	68,756	.....	7,362	156,029	.....	3,113	73.3	+	87,273	126.9
Graphite.....	3,714	402,892	0.21	3,114	248,870	0.12	600	16.2	+	154,022	38.2	
Graphite, artificial.....	548	.....	.....	904	.....	.....	356	64.9	+	.....	.....
Grindstones.....	2,523	45,754	.....	3,072	83,005	.....	549	21.8	+	37,251	81.4
Gypsum.....	336,332	881,984	0.47	152,287	823,006	0.39	184,050	54.7	+	58,978	6.7	
Magnesite.....	58,090	728,275	0.38	39,365	1,016,765	0.48	18,725	32.5	+	288,490	39.6	
Magnesium sulphate.....	929	4,645	.....	1,949	14,565	.....	1,020	109.7	+	9,920	213.6
Manganese.....	158	14,836	.....	747	6,230	.....	282	178.4	+	8,606	58.0
Mica.....	1,166	358,851	0.19	747	271,550	0.13	419	35.9	+	87,301	24.3	

Stone—

Granite	630,412	0.34	.....	590,871	0.28	.....	.....	48,541	7.6
Limestone	2,283,659	1.20	.....	2,342,403	1.11	.....	.....	58,744	2.6
Marble	55,820	0.03	.....	550	.....	.....	.....	55,270	98.0
Sandstone	261,256	0.14	.....	102,750	.....	.....	.....	158,506	60.7
Total	19,837,311	10.46	.....	19,130,799	9.05	.....	.....	706,512	3.6
Grand total	189,646,821	100.00	.....	211,301,897	100.00	.....	.....	21,655,076	11.4

*Short tons throughout. (a) The metals, copper, lead, nickel, silver and zinc as also cobalt oxides are for statistical and comparative purposes valued at the final average value of the refined metal. Pig-iron is valued at the furnace or spot, and non-metallic products at the mine or point of shipment. (b) Copper content of smelter products and estimated recoveries from ores exported, at 27.180 cents per pound in 1917, and 24.628 cents per pound in 1918. (c) The total production of blast furnace pig-iron in Canada in 1917 was 1,156,789 tons valued at \$24,290,101, of which, it is estimated, 1,110,767 tons valued at \$23,521,318 should be credited to imported ores; in 1918 the total production was 1,163,520 tons valued at \$31,776,257 of which 1,116,076 tons valued at \$30,571,554 are credited to imported ores. (d) Refined lead and lead contained in base bullion exported at 11.137 cents per pound in 1917, and 9.250 cents in 1918, the average prices in Montreal. (e) Nickel content of matte produced and nickel recovered from silver-cobalt-nickel ores valued at 40 cents in 1917 and 1918. The value of the nickel contained in matte, as returned by the operators, was from 10 to 15.8 cents per pound for both years. (f) Silver recovered in bullion and recoverable from ores and smelter products exported at 81.417 cents per ounce in 1917, and at 96.772 cents in 1918. (g) Gross returns of sale of gas as furnished by well operators. (h) In 1917 and 1918, figures as reported by the producers, which differ from those of the Trade reports.

EXPORTS AND IMPORTS.

A very large portion of the mineral production of Canada is exported for consumption or refining outside of Canada. On the other hand considerable quantities of mine products, chiefly those which have been refined or subjected to partial treatment, or in the form of manufactured goods ready for consumption, are imported.

The total value of the exports of products of the mine including direct mine products and manufactures thereof in 1918 was \$174,867,322 compared with \$171,925,863 in 1917. This value includes for 1918 mine products to the value of \$75,708,425 and manufactures valued at \$99,158,897, as against mine products valued at \$77,389,963 and manufactures valued at \$94,535,900 in 1917.

Practically the whole of the Canadian production of copper, nickel, and silver is exported, also a very large proportion of the production of gold, asbestos, and mica. There are, as well, considerable exports of coal. These products alone contribute over 88 per cent of the value of the mine products exported. Manufactured products exported consist chiefly of iron and steel goods, agricultural implements, aluminium, copper, calcium carbide, acetate of lime, fertilizers, and coke.

The United States is the chief destination of Canada's mine exports, over 72 per cent having been exported to that country during the fiscal year 1917-18, and about 20 per cent to the United Kingdom.

A great variety of mineral products, chiefly in the manufactured or semi-manufactured condition, are annually imported into Canada. These imports increased in value with great rapidity during the ten years preceding 1913. During the next two years, however, there was a falling off, but in 1916 the imports again increased to a value almost equal to that of 1913. The total value of these imports during the calendar year 1918 amounted to \$348,188,517, as compared with a value of \$354,313,551 in 1917; \$256,346,726 in 1916; \$146,465,510 in 1915; \$181,675,667 in 1914; and \$259,299,745 in 1913.

It is perhaps significant that of the total value of these imports in 1918 about one-half consisted of iron and steel goods and about 32 per cent of coal, coke, and petroleum.

Exports of Products of the Mine and Manufactures of Mine Products, Calendar Years 1917 and 1918.

Products.	1917.		1918.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Arsenic.....Cwt.	45,724	507,898	53,448	393,883
Asbestos.....Tons.	93,932	4,903,326	119,454	7,786,710
Asbestos sand and waste.....	52,088	430,956	22,144	228,059
Coal.....	1,733,156	7,387,192	1,817,195	9,405,423
Cobalt, metallic.....Lbs.		{ 1,542,945	292,015	748,705
" oxide, and salts....."			588,229	853,737
" alloys....."			73,580	298,496
Chromite (Chromic ore).....Tons.	19,229	342,528	15,831	553,616
Corundum....."	142	22,578	143	18,231
Feldspar....."		{ 410,007		101,187
Magnesite....."				816,553
Talc....."				208,301
Gold-bearing quartz, dust, nuggets, etc.....		15,929,051		10,040,813
Gypsum or plaster, crude.....Tons.	224,423	245,182	67,824	80,843
Metals, viz:—				
Copper, fine, in ore, matte, regulus, etc.....Cwt.	865,569	14,183,264	733,964	9,221,681
Lead, metallic, in ore, etc....."	134,104	925,056	226,541	1,321,890
Molybdenite....."	(a) 647	81,173	3,516	402,435
Nickel, fine....."	{ 812,724	8,708,650	17,108	707,206
" in ore, matte or speiss....."			857,677	10,556,040
Platinum, in concentrates or other forms.....Ozs.	136	11,309	12	798
Silver, metallic, in ore, concentrates, etc....."	{ 21,718,784	17,621,398	4,225,007	3,735,830
Silver bullion....."			15,132,069	14,647,072
Mica.....Lbs.	1,271,460	451,345	865,894	410,000
Mineral pigments, iron oxides, ochres.....Cwt.	29,022	30,052	15,389	18,377
Mineral water, natural, not in bottles.....Gals.	75	20	55	41
Mineral wax.....Cwt.	72,337	401,331	36,644	347,823
Oil:—				
Mineral, coal and kerosene, crude.....Gals.	2,130	183	270,302	28,415
Mineral, coal and kerosene, refined....."	28,212	6,558	1,946,967	206,675
Gasoline and naphtha....."	24,304	7,419	91,229	28,778
Ores:—				
Antimony.....Tons.	774	50,476	26	1,430
Iron....."	164,004	660,673	130,250	650,502
Manganese....."	185	16,031	784	29,208
Zinc....."	(a) 5,972	320,296	10,545	476,791
Other....."	60,863	683,380	26,828	105,628
Phosphates....."	14	200		
Plumbago, crude ore and concentrates.....Cwt.	2,232	7,455	13,278	32,710
Pyrites.....Tons.	279,646	974,200	240,453	949,067
Salt.....Cwt.	(b) 172,850	94,364	17,856	16,743
Sand and gravel.....Tons.	1,075,374	290,964	902,750	229,957
Stone, ornamental, granite, marble, etc., unwrought....."	330	359	1,042	5,059
Stone, building, freestone, limestone, etc., unwrought....."	139,153	122,430	62,683	107,690
Stone, crushed....."	2,308	2,277	1,526	1,983
Stone, for manufacture of grindstones, rough....."	310	2,062	265	276
Other articles of the mine.....		15,375		133,763
Total mine products.....		77,389,963		75,708,425
MANUFACTURES.				
Abrasives, artificial.....		(a) 1,249,513		2,028,839
Aeroplanes, and parts of.....		1,139,441		5,679,674
Agricultural implements and machines, viz:				
Mowing machines.....No.	12,149	486,593	8,694	566,878
Cultivators....."	6,336	170,611	3,383	147,724
Reapers....."	2,771	188,897	457	39,573
Drills....."	6,240	314,435	8,997	791,590
Harvesters and binders....."	9,502	1,158,757	5,549	989,031
Ploughs....."	25,354	1,150,386		1,536,550
Harrow....."	4,093	93,609	5,104	141,871
Hay rakes....."	4,704	116,395	1,126	43,315
Seeders....."	26	2,621	37	3,432
Threshing machines....."	1,172	274,764	478	219,174
All others.....		297,640		371,667
Parts.....		1,025,275		833,965

(a) Nine months ending December, 1917.

(b) Includes non-domestic in part.

**Exports of Products of the Mine and Manufactures of Mine Products, Calendar
Years 1917 and 1918—Concluded.**

Products.	1917.		1918.	
	Quantity.	Value.	Quantity.	Value.
MANUFACTURES.—Continued.				
Asbestos, manufactures of		\$ 55,666		\$ 40,763
Bricks..... M.	4,464	40,039	3,277	34,593
Cement.....		16,857		13,752
Clay, manufactures of		83,600		129,691
Coke..... Tons.	23,595	137,318	29,612	223,629
Cream separators		150,923		115,120
Drugs, chemicals and medicines, viz :—				
Acetate of lime..... Cwt.	67,607	246,042	42,859	216,613
Acid sulphuric..... "	189,551	197,888	111,992	165,579
Ammonium sulphate..... "	(a) 160,947	693,377	173,926	1,027,558
Calcium carbide..... "	1,629,827	4,027,894	1,172,547	4,369,512
Cyanamid..... "	(a) 749,955	1,837,959	921,274	2,346,918
Earthenware and manufactures of		14,504		10,633
Fertilizers.....		1,253,667		190,697
Gasoline engines and parts of..... No.	800	152,275	1,395	271,173
Grindstones, manufactured		29,242		46,872
Guns, rifles, firearms.....		2,846,075		1,118,562
Gypsum or plaster, ground.....		146,384		101,618
Iron and steel and manufactures of, viz :—				
Stoves of all kinds.....		50,451		84,640
Gas buoys and parts of.....		85		
Castings, n.o.p.....		583,297		516,742
Ferro-silicon and ferro compounds..... Tons.	33,212	2,616,924	23,781	2,671,434
Pig-iron..... "	12,081	423,814	2,130	169,495
Linotype machines and parts of.....		6,977		5,937
Machinery, n.o.p., and parts of.....		2,499,581		5,349,457
Sewing machines, and parts of..... No.		157,809		50,054
Washing machines and wringers.....		6,400		14,447
Typewriters..... No.	1,883	97,904	3,461	192,401
Scrap iron or steel..... Cwt.	3,531,826	2,300,022	1,030,890	853,097
Bars and rods..... Tons.	(a) 41,321	3,633,787	105,285	10,312,657
Billets, blooms, ingots..... "	(a) 41,558	1,831,917	61,782	2,645,943
Rails..... "	26,402	1,605,742	12,952	575,062
Hardware, viz :—				
Wire and wire nails..... Cwt.	2,109,637	9,823,700		6,294,195
Tools, hand or machine.....		940,347		1,962,883
Hardware, n.o.p.....		917,177		1,995,603
All other iron or steel, n.o.p.....		7,000,678		8,907,060
Lime..... Cwt.		74,523	149,637	70,930
Metals :—				
Aluminium in bars, blocks, etc..... Cwt.	223,246	7,620,953	216,165	7,223,570
Aluminium, manufactures of.....		17,165		197,670
Brass, old and scrap..... Cwt.	595,000	9,615,627	91,849	1,454,451
" rods, sheets, tubing..... "			26,368	703,227
Copper in pigs, bars, sheets, etc..... "	175,706	4,776,025	467,807	11,378,440
Copper, old and scrap..... "	157,939	4,296,989	8,953	171,988
Lead in pigs, etc..... "	10,045	62,453	74,617	668,807
Metallic shingles and laths and corrugated roofing.....		41,084		13,823
Plated ware, n.o.p.....		23,164		21,735
Platinum, old and scrap..... Ozs.	(a) 195	18,290	185	20,094
Metals, n.o.p.....		5,611,556		3,920,919
Mineral and aerated waters in bottles.....		10,745		20,173
Oil, n.o.p..... Gals.	4,264,160	1,041,467	1,405,984	308,776
Plumbago, manufactures of.....		384,505		205,993
Stone, of all kinds, dressed.....		1,816		4,598
Tar.....		43,547		67,646
Tin, manufactures of.....		88,844		195,812
Vehicles :—				
Automobiles..... No.	9,492	4,561,875	10,361	5,076,076
" parts of.....		2,035,769		919,738
Bicycles..... No.	454	61,984	93	4,451
" parts of.....		52,260		91,867
Total Manufactures.....		94,535,900		99,153,897
Grand Total.....		171,925,863		174,867,322

(a) 9 mos.

Summary of Exports.

	1915. Value.	1916. Value.	1917. Value.	1918. Value.
	\$	\$	\$	\$
Mine products.....	61,814,582	80,755,461	77,389,963	75,708,425
Manufactures.....	62,343,179	90,423,122	94,535,900	99,158,897
	124,157,761	171,178,583	174,867,322	171,925,863

EXPORTS.

Showing Destination of Mine Products during the Fiscal Years 1915-16, 1916-17, and 1917-18.

Destination.	1915-16. Value.	1916-17. Value.	1917-18. Value.
<i>British Empire.</i>	\$	\$	\$
United Kingdom.....	12,425,248	15,545,227	14,513,456
Australia.....	122,409	53,297	96,479
Bermuda.....	5	210	191
British South Africa.....	43,397	27,151	12,036
" Guiana.....	28,812	109,590	144,950
" India.....		119,559	306,663
" E. Indies, other.....		37,567	
" W. Indies.....	9,170	60	32,392
" Strait Settlements.....			20
Gibraltar.....	3,301	55,828	
Hong Kong.....	498,991	263,812	606,377
Newfoundland.....	806,726	919,300	1,122,222
New Zealand.....	695	12,639	1,141
Total British Empire.....	13,943,754	17,144,240	16,835,927
<i>Other Countries.</i>			
Alaska.....	295,169	347,124	388,732
Argentina.....	102	132	
Brazil.....		135	26
Chili.....		6,991	2,826
China.....	368,199	135,483	1,262,910
Cuba.....	7,304	5,194	206
Denmark.....		7,646	5,319
Danish West Indies.....			90
Egypt.....		3,312	
France.....	186,868	555,589	291,681
French W. Indies.....		900	
Greece.....	914	4,644	
Greenland, Iceland, etc.....	4,957		5,980
Hawaii.....	1,804		246,877
Holland.....	5,130	17,923	152,590
Italy.....	154,783	212,938	288,008
Japan.....	61,016	146,440	592,097
Mexico.....	9,393		
Miquelon and St. Pierre.....	40,919	22,107	57,989
Norway.....			8,133
Peru.....	237		
Porto Rico.....	2,016		
Russia.....	62,687	24,885	
San Domingo.....		6,456	13,175
Spain.....	9,900		78,025
Sweden.....	9,001		6,755
United States.....	51,425,708	66,974,768	53,523,156
Total other countries.....	52,646,107	68,472,667	56,924,575
Grand total.....	66,589,861	85,616,907	73,760,502

IMPORTS.

Imports of Products of the Mine and Manufactures of Mine Products—Calendar Years 1916, 1917, and 1918.

Products.	1916. Value.	1917. Value.	1918. Value.
	\$	\$	\$
Alumina.....	1,114,061	1,866,240	2,071,060
Alum, alum cake and chloralum.....	471,836	423,903	382,132
Aluminium and manufactures.....	671,098	560,481	383,985
Ammonia, nitrate of.....	202,153	283,853	19,019
Ammonia, sulphate of.....	9,672	26,062	1,273
Antimony regulus.....	208,450	61,732	92,678
Antimony salts.....	13,891	6,295	18,986
Arsenic, oxide and sulphide of.....	18,925	54,136	33,573
Asbestos.....	334,670	537,431	604,703
Asphaltum.....	563,446	454,403	428,173
Bells and gongs.....	72,420	84,021	77,729
Bismuth.....	8,608	12,922	13,496
Blanc fixé and satin white.....	86,306	90,482	92,241
Blast furnace slag.....	4,602	7,106	18,506
Borax.....	265,933	381,294	199,210
Brick and tile.....	390,467	442,455	303,596
Brick, fire, of a kind not made in Canada, and n.o.p.....	1,657,792	3,156,591	3,712,677
Bromine and bromides.....	413	530	1,032
Burrstones.....	648	910	1,571
Cement, portland, and manufactures.....	43,747	28,356	23,360
Chalk, Cornwall stone, feldspar, fluorspar, magnesite, mica, schist.	170,498	264,220	256,858
Clays: china, fire, pipe, and all other.....	325,494	416,209	554,353
Coal: anthracite, bituminous, slack, and run-of-mine.....	38,289,666	70,562,357	71,650,584
Coke.....	2,229,078	6,517,260	8,975,445
Coke, ground for electric batteries.....	8,119	15,239	22,849
Copper and manufactures of.....	7,566,080	10,015,561	6,372,412
Cryolite.....	78,916	101,141	167,586
Crucibles, clay or plumbago.....	520,341	798,044	113,856
Chloride of lime.....	158,546	100,834	162,748
Cyanides of potassium, sodium, cyanogen, or cpd. of bromine.....	507,021	505,294	459,136
Diamonds, unset, and bort.....	1,332,957	1,368,887	1,367,801
Earthenware.....	2,180,414	2,595,582	2,163,455
Earths, crude.....	4,074	3,917	2,514
Electric carbons.....	58,676	65,225	57,151
Emery and manufactures.....	367,719	632,836	659,912
Fertilizers, compound or manufactured.....	639,884	1,045,140	1,054,962
Flint, quartz, silix, etc.....	90,280	77,104	121,879
Foundry facings.....	27,638	47,416	45,798
Fullers' earth.....	13,072	17,004	16,969
Fossils.....	2,699	6,943	11,324
Gannister.....	2,833	23,954	12,465
Gold and silver and manufactures of.....	20,016,288	2,921,018	824,418
Graphite and manufactures of.....	103,150	171,209	226,777
Grindstones.....	122,291	185,607	297,287
Gypsum and plaster of Paris.....	43,291	35,460	22,065
Hydro-fluo-silicic acid.....	28,611	97	80
Iron and steel—Total, 1916: \$129,040,248			
1917: 187,191,534			
1918: 169,538,669			
Pig-iron and kentledge.....	1,145,150	2,764,165	2,102,435
Ferro products and chrome steel.....	1,893,879	2,045,595	4,335,109
Ingots, blooms, billets, puddled bars, etc.....	895,446	1,401,782	262,210
Scrap iron and scrap steel.....	179,751	454,079	775,526
Plates and sheets.....	12,806,896	17,582,700	14,114,139
Tin plates and sheets.....	5,221,163	9,985,631	11,403,887
Bars, rods, hoops, bands, etc.....	13,362,807	22,567,187	17,849,982
Structural iron and steel.....	8,042,127	15,282,012	11,004,159
Rails and connexions.....	470,023	944,595	561,970
Pipes and fittings.....	165,576	143,124	123,257
Nails and spikes.....	283,007	892,021	404,913
Wire.....	4,305,674	4,409,376	3,721,514
Forging castings and manufactures.....	3,343,559	5,976,313	3,829,760
Other iron and steel products.....	76,975,990	102,742,954	99,044,808
Iron ore.....	4,419,013	5,124,889	5,895,974

IMPORTS.

Imports of Products of the Mine and Manufactures of Mine Products—Calendar Years 1916, 1917, and 1918—*Continued.*

Products.	1916. Value.	1917. Value.	1918. Value.
	\$	\$	\$
Iron sand.....	15,641	36,737	67,528
Kainite.....	5,016	38,828	4,931
Lead and manufactures; litharge.....	2,077,896	1,732,428	1,350,689
Lime.....	96,332	78,251	53,745
Lithographic stone.....	2,768	3,921	2,757
Manganese, oxide of.....	63,786	92,616	93,477
Magnesia.....	20,651	16,186	13,200
Mercury or quicksilver.....	74,461	76,322	68,903
Metallic alloys:—			
Babbitt metal.....	20,524	36,444	27,062
Brass and manufactures of.....	4,676,374	5,328,659	4,647,872
Britannia metal and manufactures.....	25,192	20,513	25,898
German silver, nickel, and nickel silver.....	414,410	519,064	443,103
Type metal.....	2,126	1,193	85
Mineral and bituminous substances.....	344,743	647,444	914,442
Mineral water, including aerated water.....	130,933	108,444	105,967
Nickle anodes.....	6,019	8,348	3,734
Ochres, etc.....	409,258	417,502	475,853
Ores of metals, n.o.p.....	2,844,277	3,221,267	1,276,092
Paraffin wax.....	70,308	140,722	209,916
Paraffin candles.....	30,539	75,257	64,033
Petroleum and products of.....	14,604,476	22,741,709	30,475,621
Phosphates (fertilizer).....	16,182	62,543	90,363
Platinum and manufactures of.....	88,543	114,279	31,140
Potash and manufactures of.....	150,735	135,836	118,900
Precious stones.....	207,621	192,748	186,365
Pumice.....	34,554	34,162	36,938
Salt.....	694,835	1,088,205	1,267,169
Saltpetre.....	101,103	163,556	204,121
Sand and gravel.....	183,894	312,403	435,992
Slate and manufactures of.....	96,776	106,893	123,054
Sand paper.....	247,317	331,776	317,048
Soda products: barilla, bichromate, caustic, sal and salt cake.....	2,079,859	3,096,778	3,656,459
Stone and manufactures of (including marble).....	587,304	764,658	732,162
Soda, nitrate of.....	2,973,473	1,935,698	4,077,903
Sulphate of iron (copperas).....	11,549	9,952	7,783
Sulphur and phosphorus.....	1,229,356	1,549,828	2,093,936
Sulphuric acid.....	115,173	15,680	208,288
Tar, coal and pine.....	184,286	208,065	256,372
Tin and manufactures of (including tinware).....	2,999,675	5,656,665	4,204,532
Whiting and prepared chalk.....	181,349	261,812	270,197
Zinc and manufactures of.....	3,690,577	3,641,272	2,804,027
	256,346,726	354,813,551	348,188,517

Summary of Imports.

	1915.		1916.		1917.		1918.	
	Quantity.	Value.	Quantity	Value.	Quantity.	Value.	Quantity.	Value.
Brass and mfgs.		\$ 3,117,942		\$ 4,676,374		\$ 5,328,659		\$ 4,647,872
Coal. Tons.	12,465,902	23,345,605	17,580,603	38,289,666	20,857,460	70,562,357	21,678,587	71,650,584
Coke. "	637,857	1,008,404	757,116	2,224,078	970,106	6,517,260	1,165,590	8,975,445
Copper and mfgs.		3,957,770		7,565,080		10,015,561		6,372,412
Iron ore Tons.	1,504,113	2,331,755	2,339,677	4,419,013	2,251,397	5,124,889	2,200,838	5,895,974
Iron and steel mfgs.		74,308,983		129,040,248		187,191,534		169,538,669
Lead and mfgs.		2,482,916		2,077,896		1,732,428		1,350,689
Petroleum and mfgs.		7,979,254		14,604,476		22,741,709		30,475,621
Structural materials.	286,313,765	3,912,946	292,426,121	3,562,220	379,148,006	7,901,398	420,728,933	8,117,394
Tin and mfgs.		1,634,796		2,999,675		5,656,665		4,204,532
Zinc and mfgs.		2,775,358		3,690,577		8,041,272		2,804,037
All other.		14,009,711		41,131,423		27,899,819		34,155,298
Total.		146,465,510		256,346,726		354,313,551		348,188,517

PRODUCTION BY PROVINCES.

A summary of the mineral production by provinces in 1917 and 1918 is shown in the accompanying tables. The first shows the total production in the several provinces and the percentages of each for the past three years.

In comparing the relative production of the various provinces it should be remembered that Nova Scotia is not credited with the large production of pig-iron and steel at Sydney and Sydney Mines, which is made almost entirely from imported iron ores and is not naturally credited as Canadian mine product. Similarly a large proportion of the pig-iron production in Ontario is excluded from the total value, because it is derived from imported ores. The Province of Quebec, also, is not credited with the production of aluminium at Shawinigan Falls, which is made from imported bauxite.

Mineral Production by Provinces, 1916, 1917, and 1918.

Province.	1916.		1917.		1918.	
	Value of production.	Per cent of total.	Value of production.	Per cent of total.	Value of production.	Per cent of total.
	\$		\$		\$	
*Nova Scotia.....	20,042,262	11.31	21,104,542	11.13	22,317,108	10.56
New Brunswick.....	1,118,187	0.63	1,435,024	0.76	2,144,017	1.01
Quebec.....	14,406,598	8.13	17,400,077	9.18	19,605,347	9.28
Ontario.....	80,461,323	45.41	89,066,600	46.96	94,694,093	44.82
Manitoba.....	1,823,576	1.03	2,628,264	1.39	3,220,424	1.53
Saskatchewan.....	590,473	0.33	860,651	0.45	1,019,981	0.48
Alberta.....	13,297,543	7.50	16,527,535	8.71	23,109,987	10.94
British Columbia.....	39,969,962	22.56	36,141,926	19.06	42,835,509	20.27
Yukon.....	5,491,610	3.10	4,482,202	2.36	2,355,631	1.11
Dominion.....	177,201,534	100.00	189,646,821	100.00	211,301,897	100.00

* Includes a small production of lime from Prince Edward Island.

Mineral Production of Nova Scotia, 1917 and 1918.

Product.	1917.		1918.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Barytes.....Tons	3,490	54,027	580	9,145
Coal....."	6,327,091	19,410,737	5,818,562	21,095,470
Grindstones....."	375	9,875	256	8,000
Gold.....Ozs.	2,210	45,685	1,176	24,310
Gypsum.....Tons	215,472	301,261	49,365	115,976
Manganese....."	158	14,836		
Molybdenite.....Lbs.	94	94	180	207
Tripolite.....Tons	600	18,000	500	12,500
Tungsten concentrates.....Lbs.			1,063	372
Clay products.....		331,542		303,515
Lime.....Bus.	986,106	197,344	748,314	149,663
Stone.....		569,521		478,721
Other products.....		151,620		119,229
Total.....		21,104,542		22,317,108

The total production of blast furnace pig-iron in Nova Scotia in 1917 was 472,147 tons valued at \$10,-87,234, and in 1918, 415,870 tons valued at \$10,451,400.

Mineral Production of New Brunswick, 1917 and 1918.

Product.	1917.		1918.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Copper..... Lbs.	33,920	9,219		
Coal..... Tons	189,095	708,010	268,212	1,331,710
Grindstones..... "	2,148	35,879	2,816	75,005
Gypsum..... "	38,556	191,631	27,225	214,114
Natural gas..... M. cu. ft.	796,775	103,735	792,396	107,842
Petroleum..... Bls.	2,341	5,460	3,009	7,402
Silver..... Ozs.	400	326		
Tungsten concentrates..... Lbs.			22,000	8,693
Clay products.....		51,804		39,055
Lime..... Bus.	532,251	171,248	482,548	221,935
Stone.....		111,150		99,044
Other products.....		47,062		39,217
Total.....		1,435,024		2,144,017

Mineral Production of Quebec, 1917 and 1918.

Product.	1917.		1918.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Copper..... Lbs.	5,015,560	1,363,229	5,869,649	1,445,577
Gold..... Ozs.	1,511	31,235	1,939	40,083
Iron ore, sold for export..... Tons.	16,488	48,599	6,330	28,211
Lead..... Lbs.	1,378,001	153,468	2,110,059	195,180
Molybdenite..... "	216,693	216,693	333,318	383,315
Silver..... Ozs.	136,194	110,885	178,675	172,907
Zinc..... Lbs.	1,786,740	159,038	2,802,928	228,691
Asbestos and asbestic..... Tons.	153,771	7,228,233	158,259	8,970,797
Chromite..... "	36,725	499,682	21,324	835,727
Feldspar..... "	1,188	8,204	191	4,279
Graphite (a)..... "	541	106,305	180	40,018
Magnesite..... "	58,090	728,275	29,365	1,016,765
Mica..... "		286,730	481	229,119
Mineral water.....		9,201		7,609
Iron oxides..... Tons.	9,409	87,605	17,317	112,440
Phosphate..... "	123	1,230	140	1,200
Pyrites..... "	122,882	501,351	124,871	507,802
Quartz..... "	550	1,788	1,730	5,383
Cement..... Bls.	2,079,625	3,274,989	1,564,360	3,003,571
Clay products.....		973,716		798,058
Kaolin..... Tons.	533	9,594	863	19,299
Lime..... Bus.	1,470,486	335,012	1,527,784	418,888
Slate..... Squares.	1,422	7,789	933	5,124
Stone.....		991,593		952,402
Other products.....		265,633		182,902
Total.....		17,400,007		19,605,347

There was also in this Province an important production of aluminium from imported ores.

(a) Includes small production from Baffin Land.

Mineral Production of Ontario, 1917 and 1918.

Product.		1917.		1918.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Asbestos.....	Tons	10	2,150		
Cobalt, metallic and in oxide, etc.....	Lbs.	1,079,572	1,727,815	1,347,544	3,368,860
Copper.....	"	42,867,774	11,651,461	47,074,475	11,593,502
Gold.....	Ozs.	423,261	8,749,581	411,976	8,516,299
Iron ore, sold for export.....	Tons	152,764	542,097	109,942	464,188
Iron, pig, from Canadian ore (a).....	"	46,022	768,783	47,444	1,204,703
Lead.....	Lbs.	1,586,711	176,712	1,684,366	155,804
Molybdenite.....	"	68,213	68,213	42,931	49,371
Nickel.....	"	84,330,280	33,732,112	92,507,293	37,002,917
Silver.....	Ozs.	19,301,835	15,714,975	17,198,737	16,643,562
Actinolite.....	Tons	120	1,320	228	2,508
Arsenious oxide.....	"	2,656	658,231	2,482	520,525
Barytes.....	"			60	1,020
Corundum.....	"	188	32,153	137	26,112
Feldspar.....	"	18,274	81,622	18,591	108,449
Fluorspar.....	"	4,249	68,756	7,187	150,779
Graphite.....	"	3,173	296,587	2,934	208,852
Gypsum.....	"	48,947	130,138	38,214	151,564
Mica.....	"		72,121	266	42,431
Mineral water.....	"		135,231		145,400
Natural gas.....	M. cu. ft.	19,868,036	3,641,587	13,029,524	2,884,460
Petroleum.....	Bls.	202,991	473,477	288,692	777,737
Phosphate.....	Tons	26	256		
Pyrites.....	"	288,058	1,080,866	268,507	1,133,963
Quartz.....	"	177,983	362,251	216,559	474,772
Salt.....	"	138,909	1,047,792	131,727	1,285,039
Talc.....	"	15,778	76,139	18,169	119,197
Cement.....	Bls.	1,676,904	2,267,610	1,220,003	1,976,815
Clay products.....	"		2,575,304		2,434,215
Lime.....	Bus.	2,846,850	668,368	2,660,791	762,976
Sand-lime brick.....	No.	10,667,600	100,885	8,081,301	91,902
Stone.....	"		992,455		1,079,745
Other products.....	"		1,170,052		1,316,426
Total.....			89,066,600		94,694,093

(a) The total production of blast-furnace pig-iron in Ontario in 1917 was 684,642 tons, valued at \$13,902,867; in 1918, 747,650 tons, valued at \$21,324,857.

Mineral Production of Manitoba, 1917 and 1918.

Product.		1917.		1918.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Copper.....	Lbs.	1,116,000	303,329	2,339,751	576,234
Gold.....	Ozs.	440	9,095	6,755	139,638
Silver.....	"	7,201	5,863	13,316	12,886
Tungsten concentrates.....	Lbs.			177	42
Calcined gypsum.....	Tons	33,347	258,934	37,483	341,352
Clay products.....	"		114,651		116,417
Lime.....	Bus.	393,982	92,932	462,544	134,725
Cement.....	Bls.	544,949	1,175,669	500,302	1,283,948
Sand-lime brick.....	No.	5,070,500	76,742	5,395,423	82,438
Stone.....	"		301,965		238,251
Other products.....	"		289,081		294,493
Total.....			2,628,264		3,220,424

Mineral Production of Saskatchewan, 1917 and 1918.

Product.		1917.		1918.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Coal.....	Tons	355,445	662,451	346,847	722,148
Clay products.....			78,251		133,935
Sand-lime brick.....	No.	674,500	7,674	512,600	5,126
Other products.....			112,275		158,572
Total.....			860,651		1,019,781

Mineral Production of Alberta, 1917 and 1918.

Product.		1917.		1918.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Gold, alluvial.....	Ozs.			27	558
Coal.....	Tons.	4,736,368	14,153,685	5,972,816	20,537,287
Natural gas.....	M. cu. ft.	6,744,130	1,299,976	6,318,389	1,358,638
Petroleum.....	Bls.	8,500	63,302	13,040	100,004
Cement.....	"	259,423	567,969	200,401	528,672
Clay products.....			309,991		381,074
Lime.....	Bus.	104,540	35,516	80,408	44,141
Sand-lime brick.....	No.	1,547,590	15,703	600,000	6,600
Stone.....			7,482		569
Other products (a).....			73,911		152,444
Total.....			16,527,535		23,109,987

(a) Includes in 1917 a small value in copper, zinc and silver, in addition to sand and gravel.

Mineral Production of British Columbia, 1917 and 1918.

Product.	1917.		1918.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Copper (a).....Lbs.	57,730,959	15,691,275	62,865,681	15,482,560
Gold.....Ozs.	133,742	2,764,693	175,334	3,624,476
Iron ore sold for export.....Tons.			2,200	6,600
Lead.....Lbs.	29,483,725	3,283,602	47,594,328	4,402,475
Molybdenite....."	3,705	3,705	1,600	1,840
Platinum.....Ozs.	57	3,23	39	2,560
Silver....."	2,655,994	2,162,430	3,921,336	3,794,755
Zinc.....Lbs.	27,861,441	2,479,947	32,280,247	2,633,745
Arsenic.....Tons.	280	11,200	1,078	43,114
Chromite....."			670	31,395
Coal....."	2,433,888	8,235,716	2,568,589	11,494,681
Fluorspar....."			175	5,250
Gypsum....."	10	20		
Manganese....."			440	6,230
Magnesium sulphate....."	929	4,645	1,949	14,565
Mineral water....."		1,382		1,455
Pyrites.....Tons.	5,709	28,545	18,238	63,454
Quartz....."	37,755	132,143	49,886	149,658
Talc....."	25	400		
Cement.....Bls.	207,587	438,069	106,415	283,497
Clay products....."		334,685		357,921
Lime.....Bus.	232,955	58,067	401,562	143,697
Stone....."		265,978		187,842
Other products....."		241,661		103,739
Total.....		36,141,926		42,835,509

(a) Smelter recoveries of copper.

Mineral Production of Yukon, 1917 and 1918.

Product.	1917.		1918.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Copper.....Lbs.	2,460,079	668,650	619,878	152,663
Gold.....Ozs.	177,667	3,672,703	102,474	2,118,325
Lead.....Lbs.	127,844	14,238	9,249	856
Silver.....Ozs.	119,605	97,379	71,915	69,594
Tungsten concentrates.....Lbs.			3,848	2,593
Coal.....Tons.	4,872	29,232	2,900	11,600
Total.....		4,482,202		2,355,631

Mineral Production by Provinces, 1899-1918.

Calendar Year.	Nova Scotia.*	New Brunswick.	Quebec.	Ontario.	Manitoba.	Alberta.	Saskatche- wan.	Yukon.	British Columbia.	Total.
1899	\$ 6,817,274	\$ 420,227	\$ 2,585,635	\$ 9,819,557		\$ 17,108,707			\$ 12,482,605	\$ 49,234,005
1900	9,298,479	439,060	3,292,363	11,258,099		23,452,330			16,680,526	64,420,877
1901	7,770,139	467,985	3,759,984	13,970,010		19,297,940			20,531,833	65,797,911
1902	10,686,549	607,129	3,743,646	14,619,091		16,127,400			17,448,031	63,231,836
1903	11,431,914	580,495	3,585,938	14,160,033		14,082,986			17,899,147	61,740,513
1904	11,212,746	559,913	3,688,482	12,582,843		12,713,613			19,325,174	60,082,771
1905	11,507,047	559,035	4,405,975	18,833,292		11,387,642			22,386,008	69,078,999
1906	12,894,303	646,328	5,242,058	25,111,682		10,092,726			25,299,600	79,286,637
1907	14,532,040	664,467	6,205,553	30,381,638	\$ 898,775	\$ 4,657,524	\$ 533,251	\$ 3,335,898	25,656,056	86,865,202
1908	14,487,108	579,816	6,372,949	30,623,812	584,374	5,122,505	413,212	3,669,590	23,704,635	85,557,101
1909	12,504,810	657,035	7,086,265	37,374,577	1,193,377	6,047,447	456,246	4,032,678	22,479,006	91,831,411
1910	14,195,730	581,942	8,270,136	43,538,078	1,500,359	8,996,210	498,122	4,764,474	24,478,572	106,823,623
1911	15,409,397	612,830	9,304,717	42,796,162	1,791,772	6,662,673	636,706	4,707,432	21,299,305	103,220,994
1912	18,922,236	771,004	11,656,998	51,985,876	2,463,074	12,073,589	1,165,642	5,933,242	30,076,635	135,048,290
1913	19,376,183	1,102,613	13,475,534	59,167,749	2,214,496	15,054,046	881,142	6,276,737	28,086,312	145,634,812
1914	17,584,639	1,014,570	11,836,929	53,034,677	2,413,489	12,684,234	712,313	5,418,185	24,164,039	128,863,075
1915	18,088,342	903,467	11,619,275	61,071,287	1,318,387	9,904,347	451,933	5,057,708	23,689,425	137,109,171
1916	20,042,262	1,118,187	14,406,598	80,461,323	1,823,576	13,297,543	590,473	5,491,610	39,469,962	177,201,534
1917	21,104,542	1,435,024	17,400,077	89,066,600	2,628,264	16,527,535	860,651	4,482,202	36,141,926	189,646,821
1918	22,317,108	2,141,017	19,605,347	94,694,093	3,220,424	23,109,987	1,019,781	2,355,631	42,835,509	211,301,887

* Includes a small production from Prince Edward Island.

MINE PRODUCTION.

The statistics of mineral production presented in the preceding tables are based as already explained in so far as metalliferous ores are concerned on the actual or probable recovery of refined metals from the ores treated. An endeavour has been made to compile another series of records eliminating as far as possible the metallurgical operations and to include only the actual quantities of ores, or concentrates shipped from mines and the net value of same. It has not been found feasible, however, to eliminate entirely the metallurgical operations in certain cases such as the recovery of bullion in placer operations, the recovery of gold bullion from milling ores and of silver bullion by those plants carrying on milling operations as well as mining, there being no commercial basis on which a separation of values could be made.

A record of mine production compiled on this basis is shown in the following tables and includes a record of the tonnage and value of ores, or minerals mined, treated and shipped, the quantities of metals contained in ores shipped and records of labour employed and wages paid. It should be noted that these records cover only active shipping mines and do not include any record of the labour employed in the smelting and refining of ores, nor in blast furnace operations, with the exceptions noted. Previous to 1917 no record was obtained of the labour employed in connexion with the production of petroleum, and similar returns in respect to placer mining were not sufficiently complete to be included in the tables. The values of the ores given are in general those furnished by the operators. In certain cases, however, where such values have not been furnished, estimates have been made.

The tables showing the quantities of metals contained in the ores shipped give the total quantities of metals contained without any deductions or allowances being made for smelter, or treatment losses.

Mine Production, 1914.

	No. of mines or works	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under-ground.	Surface.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Iron ores	5	598		364,489	345,410	244,854	542,041
Milling gold ore—							
Bullion shipped.....	44	1,070	1,206	2,603,414	754,732	13	6,101,463
Concentrates						6,974	860,379
Silver-cobalt ores—							
Mine bullion shipped.....	29	1,412	1,883	3,207,116	733,174	354	5,665,006
Ore and concentrates						16,917	7,827,140
Nickel-copper ores.....	9	736	1,286	1,693,997	1,000,364	999,908	5,020,003
Copper ores.....	4	113	180	177,721	119,292	117,762	502,637
Silver-lead-zinc ore—							
Lead ore and concentrate..	76	394	817	1,110,876	186,646	70,207	2,652,802
Zinc " "						10,893	262,563
Gold-copper-silver ores.....	20	823	1,746	2,512,241	1,857,788	1,647,973	9,580,537
Placer mining—							
Yukon.....						10	5,182,616
British Columbia.....						1	565,000
Alberta.....							992
Total metalliferous.....	187	11,994		11,669,854	4,997,406	3,115,855	44,763,179
Total non-metalliferous.....	451	33,732		22,053,526	17,078,306	14,708,307	43,467,229
Total structural materials.....	1,023	21,129		9,881,316			26,009,227
	1,661	66,855		43,609,696			114,239,635

Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.
	Ozs.	Ozs.	Lbs.	Lbs.	Lbs.	Lbs.
Milling gold ore—						
Bullion.....	289,860	85,110				
Concentrates	38,717	64,218		90	15,141	
Silver-cobalt ores—						
Mine bullion shipped.....		10,335,527				
Ore and concentrates		15,523,608				
Nickel copper ores.....			60,800,799	36,300,532		
Copper ores.....	1,059	51,440		6,450,899		
Silver-lead-zinc ores—						
Lead ore and concentrate	334	2,501,820			50,527,130	
Zinc " "		376,420				9,101,460
Gold-copper-silver ores.....	182,784	761,896		53,771,126		
Placer mining—						
Yukon.....	247,753	55,744				
British Columbia.....	27,332					
Alberta.....	48					
Total	787,887	29,755,777	60,800,799	96,522,647	50,542,271	9,101,460

Mine Production, 1915.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under-ground	Surface.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Antimony ore.....	7	157		55,038	15,318	1,491	83,971
Molybdenite.....	4	52		16,990		37	28,450
Iron ores.....	5	399		230,346	251,742	398,112	774,427
Milling gold ore—							
Bullion shipped.....	50	1,324	1,555	2,893,187	1,180,477	18	8,953,130
Concentrates.....						8,335	711,947
Silver-cobalt ores—							
Mine bullion shipped.....	25	1,008	1,531	2,363,414	588,404	232	3,410,936
Ore and concentrates.....						61,362	8,326,776
Nickel-copper ores.....	9	857	1,745	2,202,536	1,364,048	1,372,724	10,552,673
Copper ores.....	6	173	205	215,065	141,758	142,121	1,026,562
Silver-lead and zinc ores.....	66	328	784	960,894	215,694	73,752	2,958,394
Zinc.....						14,895	540,022
Gold-copper-silver ores.....	33	886	1,694	2,868,449	2,380,709	2,186,646	10,947,059
Placer mining—							
Yukon.....						9	4,776,145
British Columbia.....							770,000
Alberta.....							4,026
Total metalliferous.....	205	12,698		11,805,919	6,138,150	4,259,734	53,864,518
Total non-metalliferous.....	472	30,392		20,257,126	16,594,889	14,481,882	43,373,571
Total structural materials.....	943	13,786		5,657,717			17,920,759
	1,618	56,876		37,720,762			115,158,848

Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Antimony
	Ozs.	Ozs.	Tons.	Tons.	Tons.	Tons.	Tons.
Antimony ore.....							540
Milling gold ore—							
Bullion.....	430,981	87,116					
Concentrates.....	35,779	37,507					
Silver-cobalt ores—							
Mine bullion shipped.....		6,752,183					
Ore and concentrates.....		17,603,943					
Nickel-copper ores.....			43,891	23,318			
Copper ore.....	1,151	64,965		3,538			
Silver-lead-zinc ores—							
Lead ore and concentrate.....	459	2,637,444			24,354		
Zinc " " ".....		316,731				6,116	
Gold-copper-silver ores.....	202,127	849,784		34,758			
Placer mining—							
Yukon.....	229,803	25,689					
British Columbia.....	37,249						
Alberta.....	195						
Total.....	937,744	28,375,362	43,891	61,614	24,354	6,116	54

Mine Production, 1916.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under- ground.	Sur- face.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Antimony ore.....	5	116		59,957	14,947 (a)	938	136,360
Molybdenite.....	9	262		122,072	13,522 (b)	78	156,461
Iron ores.....	4	530		376,716	331,822	275,176	715,107
Milling gold ore—							
Bullion shipped.....	49	1,304	1,709	3,540,899	1,502,336	21	10,418,052
Concentrates.....						9,340	522,409
Silver-cobalt ores—							
Mine bullion shipped.....						171	3,444,736
Ore and concentrates...	32	1,034	1,561	2,450,614	547,882	77,453	9,736,490
Nickel-copper ores.....	6	875	1,837	2,824,818	1,566,333	1,566,333	11,766,201
Copper ores.....	12	232	261	293,115	170,666	155,999	1,444,676
Silver-lead and zinc ores.	84	573	1,070	1,803,633	395,802	84,516	4,568,500
Zinc.....						82,077	1,086,249
Gold-copper-silver ores...	59	1,259	1,975	4,395,924	2,907,344	2,431,930	18,544,772
Placer mining—							
Yukon.....						9	4,413,958
British Columbia.....							580,500
Alberta.....							1,695
Total metalliferous.....	260	14,598		15,867,748	7,450,654	4,684,041	67,536,166
Total non-metalliferous...	532	30,541		24,987,562	18,170,207	15,699,830	53,414,983
Total structural materials.	816	12,465		6,237,168			17,467,186
Total.....	1,608	57,604		47,092,478			138,418,331

(a) Includes refined antimony.

(b) MoS₂ contents of concentrates produced.

Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Antimony
	Ozs.	Ozs.	Tons.	Tons.	Tons.	Tons.	Tons.
Antimony ore.....							429
Milling gold ore—							
Bullion.....	519,202	102,349					
Concentrates.....	30,138	54,136					
Silver-cobalt ores—							
Mine bullion shipped.....		4,982,702					
Ore and concentrates...		15,690,716					
Nickel-copper ores.....			51,127	25,266			
Copper ores.....	713	65,438		4,638			
ver-lead-zinc ores.....	784	2,582,952			27,062		
Zinc products.....		363,262				24,249	
Gold-copper-silver ores.....	163,466	905,685		42,126			
Placer mining—							
Yukon.....	211,010	47,703					
British Columbia.....	28,082						
Alberta.....	82						
Total.....	954,477	24,794,943	51,127	72,030	27,062	24,249	429

Mine Production, 1917.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under- ground.	Surface				
METALLIFEROUS ORES.	No.	No.	No.	\$	Tons.	Tons.	\$
Antimony ore.....	1	46		35,739	8,182	361	22,000
Molybdenite.....	23	501		260,692	26,871	1,554	320,006
Iron ores.....	9	528		509,163	305,330	215,302	758,621
Milling gold ores—							
Bullion shipped.....	45	1,388	1,633	3,687,392	1,303,410	18	9,312,424
Concentrates.....						8,874	365,375
Silver-cobalt ores—							
Mine bullion shipped.....						318	7,628,740
Ore and concentrates.....	32	1,079	1,369	2,667,607	527,850	72,719	10,123,833
Nickel-copper ores.....	6	907	1,737	2,981,896	1,518,783	1,509,841	11,323,808
Silver-lead-zinc ores—							
Lead ore and concentrate.....	87	716	1,198	2,295,090	445,663	46,799	3,866,862
Zinc “ “.....						116,489	1,323,985
Gold-copper-silver ores.....	83	1,730	2,253	4,667,578	2,554,738	1,878,911	16,048,186
Placer mining—							
Yukon.....	69	890		1,337,063		8	3,310,268
British Columbia.....	34	275		208,589			496,000
Total metalliferous.....	389	16,250		18,650,809	6,690,827	3,351,194	64,900,113
Total non-metalliferous.....	763	32,088		31,398,570	18,438,815	15,468,048	63,354,363
Total structural materials..	739	10,814		6,609,872			19,837,311
	1,891	59,152		56,659,251	25,129,642	19,319,242	148,091,787

Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Anti- mony.	Molyb- denite.
	Ozs.	Ozs.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Antimony ore.....							144	
Molybdenum ore.....								165
Milling gold ore—								
Bullion.....	447,373	77,250						
Concentrates.....	21,905	99,119						
Silver-cobalt ores—								
Mine bullion shipped.....		9,248,717						
Ore and concentrates.....		12,042,990						
Nickel-copper ores.....			52,587	24,521				
Gold-copper-silver ores.....	77,599	782,521		40,479				
Silver-lead-zinc ores—								
Lead ore and concentrate.....	1,033	1,670,064			19,348			
Zinc “ “.....		465,153				32,328		
Placer mining—								
Yukon.....	176,548	39,723						
British Columbia.....	23,994							
Alberta.....								
Total.....	748,452	24,425,537	52,587	65,000	19,348	32,328	144	165

Mine Production, 1918.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under-ground.	Surface.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Molybdenum ore.	18	196	110	274,945	34,030	461	428,907
Iron ore.	11	624		693,383	254,424	211,608	885,893
Gold ore—							
Bullion shipped.	45	1,238	1,541	3,249,578	974,977	18	9,173,037
Concentrates.						15,112	411,090
Silver-cobalt ores—							
Mine bullion shipped.. }	30	1,044	1,143	2,918,474	521,472	228	6,821,528
Ore and concentrates }						73,646	9,763,737
Nickel-copper ores.	6	975	1,449	3,186,909	1,641,617	1,641,617	12,312,128
Copper-gold-silver ores.	46	1,125	1,733	4,296,649	2,665,548	1,856,899	11,658,397
Silver-lead-zinc ore—						75,256	4,705,573
Lead ore and concentrate }	83	647	1,044	1,980,351	428,066	121,200	1,228,195
Zinc “ “ }							
Placer mining—							
Yukon.	65	478		873,858		4.5	1,907,702
British Columbia.	22	128		134,092		0.5	320,000
Alberta.							558
Total metalliferous.	326	13,475		17,613,239	6,520,134	3,995,050	59,616,745
" non-metalliferous.	787	32,848		39,322,157	19,107,261	16,237,486	77,621,946
" structural.	643	9,504		6,989,496			19,130,799
Grand total.	1,756	55,827		63,924,892	25,627,395	20,232,536	156,369,490

Content of Shipments

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Molybdenite.
	Ozs.	Ozs.	Tons.	Tons.	Tons.	Tons.	Tons.
Molybdenum ore.							139
Gold ore—							
Bullion.	441,120	75,176					
Concentrates.	17,108	118,735					
Silver-cobalt ores—							
Mine bullion shipped.		6,675,863					
Ore and concentrates.		9,599,621					
Nickel-copper ores.			56,980	27,688			
Copper-gold-silver ores.	128,235	811,912		23,376			
Silver-lead-zinc ores—							
Lead ore and concentrate.	1,479	2,314,542			23,422		
Zinc “ “.	97	431,888				31,513	
Placer mining—							
Yukon.	101,744	22,892					
British Columbia.	15,480						
Alberta.	27						
Total.	705,290	20,050,679	56,980	51,064	23,422	31,513	139

Labour and Wages Statistics Covering Non-Metalliferous Mines during 1916, 1917, and 1918.

	1916.			1917.			1918.		
	Number Active Mines or Works.	Number Employed.	Wages Paid. \$	Number Active Mines or Works.	Number Employed.	Wages Paid. \$	Number Active Mines or Works.	Number Employed.	Wages Paid. \$
NON-METALLIC.									
Asbestos and asbestic.....	13	2,821	1,659,913	15	3,114	2,312,110	13	3,074	2,871,643
Chromite.....	12	229	109,146	9	253	211,105	13	233	223,375
Coal.....	277	23,611	20,884,236	329	24,536	25,963,520	381	25,419	32,899,501
Feldspar.....	7	119	42,980	8	101	55,742	12	143	108,592
Fluorspar.....	3	36	8,449	7	59	28,810	9	125	89,858
Graphite.....	6	344	191,876	5	282	191,307	4	413	121,885
Grindstones, pulpstones and soythestones.....	5	128	24,330	5	92	25,032	6	116	45,853
Gypsum.....	15	919	467,262	12	774	445,128	8	435	275,312
Magnesite.....	3	183	144,987	2	296	194,864	305	305	326,417
Mica and phosphate.....	33	241	86,101	28	283	119,440	165	165	84,521
Mineral pigments: barytes, and oxides.....	4	125	42,169	7	109	56,185	6	95	51,735
Mineral water.....	20	60	30,307	22	53	22,246	18	40	17,271
Natural gas.....	94	750	532,913	105	597	520,290	101	711	641,542
Petroleum.....	(a)	...	...	168	270	167,205	153	264	195,141
Pyrites (b).....	11	375	310,656	11	454	451,940	15	617	688,720
Quartz.....	8	167	164,763	12	289	287,817	236	319	319,840
Salt.....	9	262	219,595	10	309	249,073	9	302	286,781
All others†.....	12	171	67,879	8	157	96,736	7	145	74,170
Total non-metallic.....	532	30,541	24,987,562	763	32,088	31,398,570	787	32,848	39,322,157
STRUCTURAL.									
Cement.....	15	1,695	1,307,224	9	1,396	1,424,215	10	1,249	1,474,547
Clay products.....	290	4,164	1,740,900	276	3,915	2,174,167	230	8,423	2,131,614
Lime.....	76	758	381,365	67	770	554,617	65	741	664,867
Sand-lime brick.....	15	139	50,079	13	150	65,175	10	146	69,514
Sand and gravel.....	221	1,667	631,195	208	1,562	770,167	186	1,558	991,169
Slate.....	1	22	11,085	1	19	10,933	1	19	11,298
Stone.....	198	4,020	2,115,320	165	3,002	1,610,598	141	2,368	1,646,987
Total structural.....	816	12,465	6,237,168	739	10,814	6,609,872	643	9,504	6,989,496
Total non-metalliferous.....	1,348	43,006	31,224,730	1,502	42,902	38,008,442	1,429	42,352	46,311,653

† Includes in 1916—actinolite, corundum, manganese, tripolite and talc.
 " 1917—corundum, manganese, magnesium sulphate, tripolite and talc.
 " 1918—actinolite, corundum, magnesium sulphate, manganese, talc and tripolite.
 (a) Not collected. (b) Partial.

METALLIC PRODUCTS.

ALUMINIUM.

No commercial ores of aluminium have as yet been found in Canada. Aluminium is, however, made in extensive works at Shawinigan Falls, Quebec, from imported ores by the Northern Aluminium Company.

The imports of alumina, probably including bauxite, were in 1918, 93,211 tons valued at \$2,071,060, as against 87,154 tons valued at \$1,866,240 in 1917.

The imports of aluminium in ingots, bars, tubes, etc., were in 1918, 143.5 tons valued at \$109,411 besides manufactures of aluminium valued at \$274,574, as against 351.5 tons valued at \$319,680 besides manufactures of aluminium valued at \$240,801 in 1917.

The exports of aluminium in ingots, bars, tubes, etc., in 1918, amounted to 10,808 tons valued at \$7,223,570 together with manufactures of aluminium valued at \$197,670, as against 11,162 tons valued at \$7,620,953, and manufactures valued at \$17,165 in 1917.

The price of aluminium was fixed by the United States War Industries Board at 32 cents per pound for the first half of 1918 and at 33 cents for the balance of the year.

ANTIMONY.

Shipments of antimony ore and concentrates and of refined antimony were made intermittently during the last ten years.

There was no shipment of antimony in any form during 1918, while in 1917 the shipments of ore and concentrates were reported as 361 tons valued at \$22,000, as against 885 tons valued at \$94,537 in 1916.

There was no production of refined antimony reported in 1918, nor in 1917, whereas in 1916 the production was 107,185 pounds valued at \$41,823.

The imports of antimony, as regulus, salts, etc., were in 1918, 341.9 tons valued at \$111,664, as against 172.2 tons valued at \$68,027 in 1917.

The exports of antimony ore in 1918 amounted to 26 tons valued at \$1,430, as against 774 tons valued at \$50,476 in 1917.

The New York price of antimony during 1918 was fairly steady throughout the year, and averaged 12.581 cents per pound.

Summary of Antimony Statistics.

	1915.	1916.	1917.	1918.
Number of men employed.....	157	116	46	
Wages paid.....	\$55,038	\$59,957	\$35,739	
Refined antimony produced..... Lbs.	59,440	107,185		
" " " " Value.	\$11,888	\$41,823		
Antimony ore shipped..... Tons.	1,341	885	361	
" " " " Value.	\$81,283	\$94,537	\$22,000	
Antimony ore exported..... Tons.	1,149	794	774	26
" " " " Value.	\$82,990	\$48,158	\$50,476	\$1,430
Imports of antimony..... Tons.	1,015.1	419.3	172.2	341.9
" " " " Value.	\$355,238	\$222,341	\$68,027	\$111,664

COPPER.

The total production of copper in 1918 amounted to 59,384.7 tons valued at \$29,250,536 as against 54,613.7 tons valued at \$29,687,989 in 1917.

The 1918 production included 22.1 tons recovered in copper sulphate; 3,808.7 tons of refined copper; 18,848.3 tons contained in blister copper; 23,482.3 tons contained in nickel-copper matte exported for refining, and 13,223.2 tons, the estimated recovery from ores and concentrates exported for smelting and refining.

The production in 1917 included 15.2 tons recovered in copper sulphate; 21,982.4 tons contained in blister copper partly exported for refining and partly refined at Trail; 21,196.3 tons contained in nickel-copper matte exported for refining, and 11,419.8 tons recovered from ores and concentrates exported.

Refined copper was produced for the first time in Canada in 1916 and amounted to 483 tons, while in 1917 it was 3,901 tons and in 1918, 3,809 tons.

British Columbia contributed 52.9 per cent of the total production for Canada in 1918, while Ontario produced 39.6 per cent, Quebec 5.0 per cent, Manitoba 2.0 per cent, and the Yukon 0.5 per cent.

The imports of copper include crude and manufactured copper and copper sulphate and amounted to 12,538 tons valued at \$6,119,782, besides manufactures valued at \$253,579, as against 16,549 tons valued at \$9,699,371, and manufactures valued at \$316,190 in 1917.

The imports of brass in 1918 were 1,994 tons valued at \$993,574 containing about 1,391 tons of copper, with also manufactures of brass valued at \$3,654,298.

The 1917 imports of brass were 1,981 tons valued at \$1,277,249 containing 1,387 tons of copper, besides manufactures of brass valued at \$4,051,410.

The exports of copper include copper in ore, matte, etc., black or coarse and in pigs, and "old and scrap" and amounted in 1918 to 60,536 tons valued at \$20,772,109, as against 59,961 tons valued at \$23,256,278 in 1917.

The price of copper, which had been fixed by the United States War Industries Board in September, 1917, at 23½ cents per pound remained at this price until July, 1918, when it was raised to 26 cents.

Summary of Copper Statistics.

	1915.	1916.	1917.	1918.
Ores and concentrates shipped (a)..... Tons	2,328,767	2,587,929	1,878,911	1,856,899
" " (a)..... Value	\$11,973,621	\$19,989,448	\$16,048,186	\$11,658,397
Copper production..... Tons	50,393	58,575	54,614	59,385
" "..... Value	\$17,410,635	\$31,867,150	\$29,687,989	\$29,250,536
Production by provinces:—				
Quebec..... Lbs.	4,197,482	5,703,347	5,015,560	5,869,649
Ontario.....	39,361,464	44,997,035	42,867,774	47,074,475
Manitoba.....	"	"	(c) 1,152,960	2,339,751
British Columbia.....	56,692,988	63,642,550	57,730,959	62,865,681
Yukon.....	533,216	2,807,096	2,460,079	619,878
Imports of copper..... Tons	11,050	13,699	16,549	12,538
" (b)..... Value	\$3,957,770	\$7,566,080	\$10,015,561	\$6,373,361
Exports of copper..... Tons	53,446	66,610	59,961	60,536
" "..... Value	\$13,076,909	\$22,642,699	\$23,256,278	\$20,772,109

(a) Does not include the nickel-copper ores. See nickel.

(b) Includes manufactures of copper for which no quantities are given; in 1915, \$264,670; in 1916, \$234,421; in 1917, \$316,190, and in 1918, \$253,579.

(c) Includes in 1917 small quantities from New Brunswick and Alberta.

The exports of gold in the form of dust, nuggets, etc., in 1918 were valued at \$10,040,813, as against \$15,929,051 in 1917.

Summary of Gold Statistics.

	1915.	1916.	1917.	1918.
Gold ores and concentrates shipped.....Tons.	8,335	9,340	8,874	15,117
" " " " " " Value.	\$711,947	\$522,409	\$365,375	\$411,090
Gold bullion shipped.....Tons.	18	21	18	18
" " " " " " Value.	\$8,958,130	\$10,418,052	\$9,312,424	\$9,173,037
Gold production (<i>a</i>).....Fine ounces.	918,056	930,492	738,831	699,681
" " " " " " Value.	\$18,977,901	\$19,234,976	\$15,272,992	\$14,463,689
Production by provinces :—				
Nova Scotia.....Ozs.	6,636	4,562	2,210	1,196
Quebec....."	1,099	1,034	1,511	1,939
Ontario....."	406,577	492,481	423,261	411,976
Manitoba....."			440	6,755
Alberta....."	195	82		27
British Columbia....."	273,376	219,633	133,742	175,334
Yukon....."	230,173	212,700	177,667	102,474
Imports of gold.....Value.	\$21,302,021	\$20,938,634	\$14,601,931	\$1,831,795
Exports of gold....."	\$16,528,143	\$18,382,903	\$15,929,051	\$10,040,813

(a) Includes gold from copper ores and lead-zinc ores.

IRON AND STEEL.

Iron Ore.—The total shipments of iron ores from Canadian mines show a further falling off in 1918, being only 211,608 short tons, valued at \$885,893, or an average of \$4.18 per ton, as compared with shipments in 1917 of 215,302 tons, valued at \$758,621, or an average of \$3.52 per ton. The 1918 shipments included 130 tons from Nova Scotia, 8,159 tons from Quebec, 201,119 tons from mines in Ontario, and 2,200 tons mined in British Columbia. The ores comprised 171,312 tons of hematite and roasted hematite and siderite, 33,066 tons of magnetite, 6,330 tons of ilmenite and titaniferous ore, and 900 tons (dry) of bog ore.

The principal operations were as usual in Ontario at Helen and Magpie mines of the Algoma Steel Corporation, Ltd., all the ores mined being first roasted in the rotary kilns at Magpie before shipment. The magnetite properties at Sellwood were operated throughout the year by Moose Mountain, Limited, with an important production of briquettes from the milling and briquetting plant. The ore milled averaged about 33.8 per cent in iron, while the briquettes produced contained about 61.1 per cent iron. Shipments of 741 tons were made from three small properties in eastern Ontario.

In Quebec shipments of ilmenite were made from Ivry-on-the-Lake, in Terrebonne county, and of titaniferous ore from St. Urbain, on the north shore of the St. Lawrence. Some magnetite was also shipped from ore dumps at the old Forsyth mine in Hull township.

In British Columbia some magnetite was shipped from Texada island and a small tonnage of bog ore from near Alta Lake, on the Pacific Great Eastern railway.

In the Great Lakes region ore prices during the first half of 1918 were: Old Range Bessemer, \$5.95 per gross ton; Messabi Bessemer, \$5.75; Old Range Non-Bessemer, \$5.20; and Messabi Non-Bessemer, \$5.05. During the last half of the year these prices were increased by 45 cents per ton.

Mine operators reported 118,472 tons of ore exported to the United States and 93,136 tons shipped to Canadian furnaces. The Customs Department records show exports of iron ores, 130,250 tons, valued at \$650,502, and imports amounting to 2,200,838 tons, valued at \$5,895,974.

The quantity of iron ore charged to blast furnaces in 1918 was 2,243,740 tons, of which 96,745 tons were of domestic origin and 2,146,995 tons imported. The imported ore included: 754,622 tons of Newfoundland ore and 1,392,373 tons of "Lake ore."

Shipments of iron ore from Wabana mines, Newfoundland, in 1918, by the two Canadian companies operating there were 848,574 short tons, as against 883,346 short tons in 1917, all of which went to Sydney and North Sydney, in Cape Breton.

Pig-iron.—The total production of pig-iron in Canada in 1918 excluding the production of ferro-alloys was 1,195,551 short tons (1,067,456 gross tons) having a value of \$33,495,171 as compared with a total production in 1917 of 1,170,480 short tons (1,045,071 gross tons) valued at \$25,025,960. Of the total production 1,163,520 short tons were made in blast furnaces and 32,031 tons were manufactured in electric furnaces from scrap steel, chiefly shell turnings. In 1917 the blast furnace production was 1,156,789 tons and the electric furnace production from scrap steel was 13,691 tons. Although the total production of pig-iron was greater than in any previous year the blast furnace production was less in 1918 than the output of 1916. The recovery of high grade low phosphorus pig-iron in electric furnaces from steel turnings was in 1918 nearly two and a half times the production in 1917, the first year that these operations were undertaken.

The production of blast furnace pig-iron in Nova Scotia in 1918 was 415,870 tons, as against 472,147 tons in 1917, and with the exception of the year 1914 was the

smallest production in this Province since 1911. In Ontario the production of blast furnace pig-iron was 747,650 tons as against 684,642 tons in 1917, and was the largest production made in this Province.

Pig-iron was made from scrap in electric furnaces in three provinces: 7,449 tons in Quebec and 24,582 tons in Ontario and British Columbia, the production in the latter Province being a little over 2,000 tons.

By grades the 1918 production included: Basic, 966,409 tons; Bessemer, 15,415 tons; foundry and malleable, etc., 181,696 tons; low phosphorus iron (electric furnace), 32,031 tons. The 1917 production included: Basic, 961,656 tons; Bessemer, 14,092 tons; foundry and malleable, 181,041 tons; low phosphorus iron (electric furnace), 13,691 tons.

The old furnace plant at Midland was reconstructed and placed in operation during the year. The blast furnace plants operated included those of the Dominion Iron and Steel Company at Sydney, N.S., the Nova Scotia Steel and Coal Company at North Sydney, the Standard Iron Company at Deseronto, Ont., the Steel Company of Canada at Hamilton, Ont., the Canadian Furnace Company at Port Colborne, Ont., the Algoma Steel Corporation, Ltd., at Sault Ste. Marie, Ont., and the Midland Iron and Steel Company at Midland.

Electric furnaces were operated for the production of pig-iron from scrap at Hull and Shawinigan Falls, Que., at Orillia, Collingwood, St. Catharines, Toronto, Belleville and Bowmanville, Ont., and Port Moody, B.C.

The production of ferro-alloys in Canada in 1918, chiefly ferro-silicon but including also spiegeleisen, ferro-molybdenum and ferro-phosphorus, all with the exception of the spiegeleisen being made in electric furnaces reached a total of 44,704 tons valued at \$4,731,521. In 1917 the production was 43,465 tons valued at \$3,549,814.

The exports of pig-iron during 1918 was 2,130 tons valued at \$169,495, or an average of \$79.57 per ton, and of ferro-alloys 23,781 tons valued at \$2,671,434 or an average of \$112.33 per ton.

The imports during 1918 included 67,397 tons of pig-iron valued at \$2,102,435, or an average of \$31.19 per ton, and 35,284 tons of ferro-alloys valued at \$4,283,133 or an average of \$121.29 per ton, making a total import of pig-iron and ferro-alloys of 102,681 tons valued at \$6,385,568. The United States trade records show exports to Canada during 1918 of pig-iron and ferro-alloys amounting to 122,325 gross tons (137,004 short tons) valued at \$5,661,228, a figure considerably higher than the Canadian record.

Steel.—The production of steel ingots and direct steel castings in 1918, was 1,873,708 short tons (1,672,946 gross tons), of which 1,800,171 tons were ingots and 73,537 tons direct steel castings.

The total production in 1917 was 1,745,734 short tons (1,558,691 gross tons) of which 1,691,291 tons were ingots and 54,443 tons were castings.

The production of steel in electric furnaces in 1918 was 119,130 tons as against 50,467 tons in 1917; 19,639 tons in 1916; 5,625 tons in 1915, and 61 tons in 1914.

The total production of pig-iron, ferro-alloys and steel in electric furnaces in 1918 was 191,869.

Materials used in the production of steel in 1918 included 897,537 tons of pig-iron, 1,068,434 tons of scrap iron and steel, 44,697 tons of ferro-alloys, 59 tons of manganese ore, 48,599 tons of iron ore, 243,383 tons of limestone and dolomite, and 17,307 tons of fluorspar.

The exports of steel during 1918 as per Customs Department records included: billets, blooms and ingots 61,782 tons, valued at \$2,645,943, or an average of \$42.83 per ton; bars and rods 105,285 tons valued at \$10,312,657, or an average of \$97.95 per ton; steel rails 12,952 tons valued at \$575,062 or an average of \$44.40 per ton; wire and wire nails valued at \$6,294,195; scrap iron and steel 51,544 tons valued at \$853,097, or an average of \$16.55 per ton, together with a large quantity of manufactured iron and steel goods.

The recorded imports of iron and steel ingots and billets during the year were 3,409 tons valued at \$262,210. This item evidently does not include steel billets imported for the use of the Imperial Government. The United States trade record shows exports to Canada during the same period of 247,332 gross tons (277,012 short tons), of billets, ingots and blooms of steel valued at \$19,787,779 an average of \$80 per gross ton.

Summary of Iron and Steel Statistics, 1915-1918.

	1915.	1916.	1917.	1918.
Iron ore shipped from mines..... Short tons.	398,112	275,176	215,302	211,608
Canadian iron ore charged to blast furnaces..... "	293,305	221,773	92,065	96,745
Imported iron ore charged to blast furnaces..... "	1,463,488	1,964,598	2,084,231	2,146,995
Iron ore charged to steel furnaces..... "	74,872	55,059	39,793	48,599
Pig-iron made in blast furnaces..... "	913,775	1,169,257	1,156,789	1,163,520
Pig-iron made in electric furnaces..... "			13,691	32,031
Pig-iron and ferro-alloys exported..... "	26,545	46,106	45,293	25,911
Pig-iron imported..... "	47,842	58,130	83,400	67,397
Ferro-alloys made..... "	10,794	28,628	43,465	44,704
Ferro-alloys imported..... "	13,758	14,777	12,829	35,284
Pig-iron and ferro-alloy consumption..... "	959,254	1,255,218	1,264,876	1,316,025
Pig-iron used in steel furnaces..... "	747,834	949,444	1,112,082	897,537
Steel ingots and castings made..... "	1,020,336	1,428,249	1,745,734	1,873,708
Steel rails made..... "	232,411	90,123	46,645	162,747
Canadian coke used in iron blast furnaces..... "	578,743	712,715	634,962	561,135
Imported coke used in iron blast furnaces..... "	486,022	645,488	723,657	861,522
Iron and steel imported..... "	771,007	864,916	929,776	786,092
Number of men employed in blast furnaces..... No.	1,004			1,391
Wages paid in blast furnaces..... \$	675,453			1,941,500
Value of pig-iron produced..... \$	11,374,199	16,750,898	25,025,960	33,495,171
Value of iron and steel goods exported..... \$	48,268,148	63,873,681	46,791,681	54,764,742
Value of iron and steel goods imported..... \$	74,308,983	129,090,168	187,191,534	169,538,669

LEAD.

The production of lead in 1918 amounted to 25,699 tons valued at \$4,754,315 as compared with a production of 16,288 tons valued at \$3,628,020 in 1917, and is mainly derived from the lead-zinc mines of British Columbia.

The total shipments of lead ore and concentrates as reported by the operators were in 1918, 75,256 tons valued at \$4,705,573 and containing 46,843,602 pounds of lead, as against 46,799 tons valued at \$3,866,862 and containing 38,696,116 pounds of lead in 1917.

The total refined lead produced in Canada, including that produced from foreign ores and the pig lead produced in Ontario smelters amounted in 1918 to 31,571,112 pounds as against 32,115,114 pounds in 1917.

The imports of lead in 1918 were 7,756 tons valued at \$1,225,139 besides manufactures of lead valued at \$125,550, as against 8,432 tons valued at \$1,542,337, with also manufactures of lead valued at \$190,091.

The exports of lead in ores, concentrates, etc., and as pig, amounted in 1918 to 15,073 tons valued at \$1,990,697, as against 7,207.5 tons valued at \$987,509 in 1917.

The average price of lead at Montreal, the main Canadian market in 1918, was 9.250 cents per pound, as against 11.137 cents in 1917.

Summary of Lead Statistics.

	1915.	1916.	1917.	1918.
Number of men employed	1,112	1,643	1,914	1,691
Wages paid	\$960,894	\$1,803,633	\$2,295,090	\$1,980,351
Ores and concentrates shipped (a)..... Tons.	73,752	84,516	46,799	75,256
" " " " " " Value.	\$2,958,394	\$4,568,500	\$3,866,862	\$4,705,573
Lead production..... Tons.	23,158	20,749	16,288	25,699
" " " " " " Value.	\$2,593,721	\$3,532,692	\$3,628,020	\$4,754,315
Imports of lead..... Tons.	24,369	13,580	8,432	7,756
" " (b)..... Value.	\$2,482,916	\$2,077,896	\$1,732,428	\$1,350,689
Exports of lead, in ores, concentrates and as pig. Tons.	1,956	4,580	7,208	15,073
" " " " " " Value.	\$119,340	\$565,890	\$987,509	\$1,990,697

(a) Does not include zinc ore shipments—See "Zinc."

(b) Includes manufactures of lead for which no quantities are given ; in 1915, \$102,439 ; in 1916, \$155,278 ; in 1917, \$190,091 ; and in 1918, \$125,550.

MERCURY.

There has been no production of mercury since 1897.

The imports of mercury in 1918 were 56,936 pounds valued at \$68,903, as against 71,608 pounds valued at \$76,322 in 1917.

The average price of mercury in New York, in 1918, was \$123.47 per flask of 75 pounds, as against \$106.30 in 1917.

MOLYBDENUM.

The total production in 1918, representing the quantity of molybdenite (MoS_2) contents of the concentrates produced for which payment was made amounted to 378,029 pounds valued at \$434,733, as against 288,705 pounds valued at \$288,705 in 1917.

The total shipments of ores and concentrates were in 1918, 461.3 tons valued by the producers at \$428,807, as against 1,544.3 tons valued at \$320,006 in 1917.

All the ore produced was concentrated in Canadian mills which treated 33,935 tons in 1918, as against 22,605 tons in 1917.

NICKEL.

The nickel production of Canada includes: the nickel in the matte produced from the treatment of the Ontario nickel-copper ores and exported for refining; the refined nickel produced from Canadian matte at Port Colborne, Ont.; the refined nickel derived from the treatment of the silver-cobalt-nickel ores of Cobalt district, with also the estimated contents of the nickel oxides and nickel salts produced from these same ores. The production in 1918 amounted to 46,253.6 tons valued at \$37,002,917 as compared with 42,165.1 tons valued at \$33,732,112 in 1917.

The refined nickel produced in 1918 amounted to 1,204.5 tons, as against 132.9 tons in 1917. The large increase is due to the production of the new refinery at Port Colborne.

The imports of nickel in ingots, bars, sheets, etc., were in 1918, 319.1 tons valued at \$238,895, besides manufactures of nickel valued at \$204,208, as against 426.9 tons valued at \$369,346 and manufactures valued at \$149,718 in 1917.

The exports of nickel in ore and matte and of nickel fine amounted to 43,739.2 tons valued at \$11,263,246, as against 40,636.2 tons valued at \$8,708,650 in 1917.

The price of nickel in 1918 was around 40 cents for the greatest part of the year.

Summary of Nickel Statistics.

	1915.	1916.	1917.	1918.
Number of men employed in nickel-copper mines.....	2,602	2,712	2,644	2,424
Wages paid in nickel-copper mines.....	\$2,202,536	\$2,824,815	\$2,981,896	\$3,186,909
Nickel-copper ore shipped..... Tons.	1,372,724	1,566,333	1,509,841	1,641,617
" " " " " " Value.	\$10,552,675	\$11,766,201	\$11,323,808	\$12,312,128
Nickel-copper ore smelted..... Tons.	1,272,283	1,521,689	1,453,661	1,559,892
Bessemer matte produced..... " "	67,703	80,011	78,867	87,184
Nickel contents of matte..... " "	34,039	41,298	41,887	48,886
Copper contents of matte..... " "	19,608	22,430	21,196	23,482
Refined nickel produced from nick.-copp. matte " "				1,082
Refined nickel produced from cobalt-nickel ores " "	28	40	133	122
Total nickel production from all sources..... " "	34,154	41,479	42,165	46,254
" " " " " " Value.	\$20,492,597	\$29,035,497	\$33,732,112	\$37,002,917
Imports of nickel..... Tons.	305	446	427	319
Imports of nickel (a)..... Value.	\$274,706	\$414,410	\$519,064	\$443,103
Exports of nickel in ore and matte, and nickel fine..... Tons.	33,205	40,221	40,636	43,739
" " " " " " Value.	\$7,394,446	\$8,662,179	\$8,708,650	\$11,263,246

(a) Includes manufactures of nickel for which no quantities are given: in 1915, \$77,538; in 1916, \$89,083; in 1917, \$149,718, and in 1918, \$204,208.

PLATINUM.

The recorded production of platinum from alluvial sands was in 1918, 39 crude ounces, valued at \$2,560 as against 57 crude ounces valued at \$3,823 in 1917.

A considerable amount of platinum and of other metals of the so-called precious metals group, are being recovered from the nickel-copper matte in the refineries in the United States and England. These recoveries may however include metals derived from sources other than the Canadian ores.

The imports of platinum in 1918 were valued at \$31,140, as against \$114,279 in 1917.

The exports of platinum in concentrates and as "old and scrap" in 1918 amounted to 197 ounces, valued at \$20,892, as against 331 ounces valued at \$29,599 in 1917.

The New York price of platinum in 1918 averaged \$105.95, as against \$102.82 in 1917.

Summary of Platinum Statistics.

	1915.	1916.	1917.	1918.
Platinum production from alluvial sands..... Ozs.	23	15	57	39
Platinum production from alluvial sands..... Value.	\$ 1,063	\$ 600	\$ 3,823	\$ 2,560
Platinum recovery at International Nickel Co's. Works, New Jersey, U.S.A..... Ozs.	452	1,017	971	650
Imports of platinum as crucibles, wire, bars, etc. Value.	\$ 84,087	\$ 88,543	\$ 114,279	\$ 31,140
Exports of platinum in concentrates and "old and scrap"..... Ozs.	236	532	331	197
Exports of platinum..... Value.	\$ 11,052	\$ 41,945	\$ 29,599	\$ 20,892

SILVER.

The silver production of Canada in 1918 amounted to 21,383,979 fine ounces valued at \$20,693,704, as against 22,221,274 fine ounces valued at \$18,091,895 in 1917, and included refined silver or silver contained in silver and gold bullion; silver contained in blister copper and copper matte; and the silver estimated as recoverable from ores exported.

In 1918 Ontario produced 80.4 per cent of the total production; British Columbia 18.3 per cent, and the balance of 1.3 per cent was derived from Quebec, Manitoba, and the Yukon.

The imports of silver in 1918 were: silver bullion valued at \$368,889, as against \$959,153 in 1917; and silver sterling and in coin valued at \$68,381, as against \$104,265 in 1917.

The exports of silver in 1918 were 19,357,076 fine ounces valued at \$18,382,902, as against 21,718,784 ounces valued at \$17,621,398 in 1917, and included silver as bullion and contained in ores, etc.

The average price of silver in 1918 was 96.772 cents per ounce, as against 81.417 cents in 1917.

Summary of Silver Statistics.

	1915.	1916.	1917.	1918.
Number of men employed in Cobalt district.	2,539	2,595	2,448	2,187
Wages paid. Value.	\$2,363,414	\$2,450,614	\$2,667,607	\$2,918,474
Ores and concentrates shipped from Cobalt district. Tons.	61,362	77,453	72,719	73,646
Ores and concentrates shipped from Cobalt district. Value.	\$8,326,776	\$9,736,490	\$10,123,838	\$9,763,737
Total silver production of Canada (a) Fine Ozs.	26,625,960	25,459,741	22,221,274	21,383,979
Total silver production of Canada. Value.	\$13,228,842	\$16,717,121	\$18,091,895	\$20,693,704
Production by provinces:—				
Quebec. Ozs.	63,450	98,610	136,194	178,675
Ontario.	22,748,609	21,608,158	19,301,835	17,198,737
Manitoba. "			7,201	13,316
British Columbia. "	3,565,852	3,392,872	2,655,994	3,921,336
Yukon. "	248,049	360,101	119,605	71,915
Alberta and New Brunswick.			445	
Imports of silver, as bullion and coins. Value.	\$448,031	\$998,966	\$1,063,418	\$437,270
Exports of silver, as bullion and in ores, etc. . . Ozs.	27,672,481	25,279,359	21,718,784	19,357,076
Exports of silver, as bullion and in ores, etc. . . Value.	\$13,812,038	\$15,637,885	\$17,621,398	\$18,382,902

(a) Includes silver from silver ores of Cobalt, with also that derived from the treatment of the lead-zinc, gold, and copper ores.

TIN.

Tin ores have not yet been found in sufficient quantities in Canada to be of economic importance.

The imports of tin in 1918 were valued at \$4,204,532, as against \$5,656,665 in 1917, and included tin in blocks, pigs, etc., tin foil, bichloride of tin, tin ware and tin crystals.

There are also large imports of tin plates and sheets, the quantity in 1918 being 145,687,800 pounds valued at \$11,403,887 as against 133,351,700 pounds valued at \$9,985,631 in 1917.

The only important production previous to 1918 was that of 1912, being 14 tons of concentrates produced by the Scheelite Mines, Ltd., of Moose River, N.S.

ZINC.

The average price of spelter in New York in 1918 was 8.159 cents per pound as against 8.901 cents in 1917.

Summary of Zinc Statistics.

	1915.	1916.	1917.	1918.
Ores and concentrates shipped.....Tons	14,895	82,077	116,489	121,200
" " ".....Value	\$540,022	\$1,086,249	\$1,323,985	\$1,228,195
Zinc production.....Tons	4,886	11,682	14,834	17,542
" " ".....Value	\$1,292,789	\$2,991,623	\$2,640,817	\$2,862,436
Refined zinc produced.....Tons		2,974	9,985	12,574
Imports of zinc.....Tons	14,085	15,000	18,566	15,655
" " (a).....Value	\$2,775,358	\$3,690,577	\$3,641,272	\$2,804,027
Imports of brass.....Tons	\$ 714,410	\$ 923,523	\$1,277,249	\$ 993,574
Imports of brass manufactures.....Tons	\$2,463,532	\$3,752,851	\$1,051,410	\$3,654,298
Exports of zinc ore.....Tons	(b)	(b)	(c) 5,972	10,545
" ".....Value	(b)	(b)	\$320,296	\$476,791

(c) For nine months only.

NON-METALLIC PRODUCTS.

ABRASIVE MATERIALS.

Corundum.—The total sales of grain corundum produced from Canadian corundum ores in 1918, were 273,140 pounds valued at \$26,112 or an average of 9.9 cents per pound.

The grain corundum recovered in 1918 was obtained from 3,184 tons of rock milled, representing a recovery of 4.3 per cent. In the earlier days of the industry from 6 to 10 per cent of the rock milled was recovered in the form of grain corundum. During recent years a much lower grade of rock has been milled.

Corundum is found in an area embracing several townships in Renfrew and Hastings counties in the Province of Ontario. The industry made its appearance there in 1900, the production reaching a maximum in 1906. From 1907 to 1913 the yearly production was smaller, but fairly uniform, while operations were indefinitely abandoned on August 3, 1918.

Production.

(In Short Tons.)

Calendar Year.	Corundum-bearing rock treated.	Grain corundum graded.	% Recovery.	Grain Corundum.				Average price, cents per pound.
				Sold in Canada.	Exported.	Total.	Total value.	
1915.....	1,724	116	6.7	21	240	262	\$33,138	6.33
1916.....	1,864	67	3.6	8	59	67	10,307	7.65
1917.....	4,659	188	4.0	16	172	188	32,153	8.55
1918.....	3,184	137	4.3	0	137	137	26,112	9.9

Grindstones, Pulpstones, etc.—The total production of grindstones, pulpstones, and scythestones in 1918 was 3,072 tons valued at \$83,005, as against a production in 1917 of 2,523 tons valued at \$45,754.

The production of abrasives has been a long-established industry in Nova Scotia and New Brunswick and in so far as output is concerned has remained practically stationary for many years.

The grindstones are shipped chiefly in a finished condition and are marketed in Canada, Newfoundland, and United States, the prices ranging in 1918 from \$25 to \$60 per ton.

A number of pulpstones are usually made each year. Scythestones both finished and in the rough are also shipped as well as occasionally small quantities of grit for marble polishing.

The value of exports of grindstones finished and in the rough during 1918 according to the Trade records is \$47,148 including finished stone valued at \$46,872, and rough stone 265 tons valued at \$276. The greater proportion of the Canadian production of grindstones is exported.

To meet Canadian requirements, in Ontario and Quebec chiefly, there were imported during 1918, grindstones to the value of \$297,287; burrstones 733, valued at \$1,571; emery, \$89,020; manufactures of emery, \$570,892; pumice stone, \$36,938; sand paper, \$317,048; iron sand for glass or polishing, or for sawing stone, \$67,528; artificial abrasives, valued at \$134,328, or a total value of \$1,514,612.

	1915.		1916.		1917.		1918.	
	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
		\$		\$		\$		\$
Production:								
Nova Scotia. . . . Tons.	285	5,300	273	5,800	375	9,875	256	8,000
New Brunswick. . . "	2,295	30,468	3,205	46,982	2,148	35,879	2,816	75,005
	2,580	35,768	3,478	52,782	2,523	45,754	3,072	83,005
Exports of grindstones (a).		36,234		44,942		31,304		47,148
Imports—Abrasives								
Grindstones.		69,391		122,291		185,607		297,287
(b) Burrstones. . . . No	177	314	406	648	519	910	733	1,571
(c) Emery.		67,067		50,666		79,176		89,020
(d) Mfgs. emery.		139,665		317,053		553,660		570,892
(e) Pumice stone		18,814		34,554		34,162		36,938
(f) Iron sand		3,263		15,641		36,737		67,528
(g) Sand paper.		133,677		247,317		331,776		317,048
Artificial abrasives.		28,921		79,315		112,614		134,328
		471,112		867,485		1,334,642		1,514,612

(a) Including stone for the manufacture of grindstones. (b) Burrstones in blocks, rough or unmanufactured, not bound up or prepared by binding into millstone. (c) Emery in bulk, crushed or ground, duty free. (d) Emery and carborundum wheels and manufactures of emery or carborundum. (e) Pumice and pumice stone, ground or unground. Duty free. (f) Iron sand or globules for polishing glass or granite, or for sawing stone. Duty free. (g) Sandpaper, glass, flint, and emery paper or emery cloth.

Tripolite.—The shipments of tripolite in 1918 were reported as 500 tons, valued at \$12,500, as compared with shipments in 1917 of 600 tons, valued at \$18,000.

The shipments from year to year have varied considerably and in some seasons the producing companies shipped from stock only.

From 1902 to the present Nova Scotia has been the only province from which shipments of tripolite have been made. At the present time the principal operator is the Oxford Tripolite Company, operating in Colchester county. The crude product is dried and treated in a small mill.

A brief review of the uses of tripolite, together with a list of the principal known Canadian occurrences, was published in the Annual Report on Mineral Production for 1914.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production.	317	12,119	620	12,139	600	18,000	500	12,500

ACTINOLITE.

Mining operations were carried on during the last quarter of 1918; shipments were reported as 228 tons, valued at \$2,508—the value of the material after having been milled and prepared for market.

Production of actinolite in Canada has been confined to Elzevir and Kaladar townships, in Hastings and Addington counties, Province of Ontario, the centre for the industry being the village of Actinolite. The earliest operations date back to about 1883. For a time deposits were worked only at intervals long apart when sufficient rock was broken to meet the demand for several subsequent years.

Actinolite is used as an ingredient for a coal-tar roofing compound, the grinding of the crude material being done in such a way as not to destroy the fibre.

The only shipper in recent years is the Actinolite Mining Company, of Bloomfield, New Jersey, U.S.A., which owns deposits described as also a grinding mill at Actinolite.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production....	220	\$ 2,420	250	\$ 2,750	120	\$ 1,320	228	\$ 2,508

ARSENIC.

The demand for arsenic has been particularly strong. The Canadian production includes arsenious oxide refined and crude produced in the smelting of the arsenical silver-cobalt-nickel ores of the Cobalt district, in addition to which arsenic has been recovered at Tacoma, Wash., from the arsenical gold concentrates shipped from the Hedley gold mine at Hedley, B.C.

The total production in 1918 was 2,482 tons of arsenious oxide and approximately 1,078 tons of arsenic in concentrates, having a total valuation of \$563,639. The production in 1917 was 2,656 tons of arsenious oxide and 280 tons of arsenic in concentrates, having a total value of \$669,431.

The exports of white arsenic in 1918 were 2,672 tons, valued at \$393,883. The imports of white arsenic were 995 pounds, valued at \$222; imports of sulphide of arsenic, 301,985 pounds, valued at \$33,351; and imports of arseniate, bi-arseniat₃, and stannate of soda, 121 pounds, valued at \$34.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production :		\$		\$		\$		\$
From arsenical concentrates....					280	11,200	1,078	43,114
White arsenic.....	2,396	147,830	2,186	262,340	2,656	658,231	2,482	520,525
	2,396	147,830	2,186	262,340	2,936	669,431	3,560	563,639
Exports : White arsenic.....	2,318	174,190	1,975	197,458	4,286	507,898	2,672	393,883
Imports:	Pounds.		Pounds.		Pounds.		Pounds.	
White arsenic.....	14,222	657	41,090	7,086	247,610	32,083	995	222
Sulphide of arsenic.....	171,993	5,415	239,991	11,839	252,848	22,053	301,985	33,351
Arseniate of soda.....	9,090	503	15,779	1,228	4,469	588	121	34

ASBESTOS.

The production of asbestos has increased very greatly during the past four years, and average prices in 1918 were about three to four times those of 1914. As usual the production has all been derived from Black Lake, Thetford, Robertsonville, Coleraine, East Broughton and Danville in the Eastern Townships, Province of Quebec.

There was a falling off in 1918 of 1,955 tons in the output and 1,691.4 tons in the sales of *crude* asbestos, but an increase in average price from \$510.47 per ton in 1917 to \$671.28 in 1918. The shipments of *mill* stock were increased in 1918 by 7,651 tons and the average price was increased from \$34.08 in 1917 to \$46.88 in 1918.

The total value of the shipments of asbestos and asbestic in 1918 was \$8,970,797, as against \$7,230,383 in 1917.

The average number of men employed in mining was 1,674, and in milling 1,400 or a total of 3,074, and the total wages paid were \$2,871,643. The tonnage of rock mined and quarried was 2,462,381 and the tonnage milled 2,185,572.

Exports of asbestos during 1918 were 119,454 tons valued at \$7,786,710, or an average of \$65.19 per ton and of asbestic sand and waste, 22,144 tons valued at \$228,059, or an average of \$12.99 per ton. There was also an export of manufactures of asbestos valued at \$40,763. In 1918 there were 10,346 tons valued at \$894,367 exported to Great Britain, 99,182 tons valued at \$6,114,510 to United States, 3,821 tons valued at \$352,594 to Italy, 1,500 tons valued at \$119,874 to France, and 4,605 tons valued at \$305,365 to other countries.

The imports of asbestos and manufactures of asbestos in 1918 were valued at \$604,703.

Output, Sales, and Stocks of Asbestos.

	Output.		Sales.		Stocks on hand December 31.		
	Tons.	Tons.	Value.	Per ton.	Tons.	Value.	Per ton.
1918.							
Crude.....	4,313	3,692	\$ 2,478,363	\$ 671.28	1,686	\$ 1,109,402	\$ 658.00
Mill stock.....	139,143	137,770	6,458,441	46.88	12,560	941,612	74.97
	143,456	141,462	8,936,804	63.17	14,246	2,051,014	143.97
Asbestic.....		16,797	33,993	2.02			
1917.							
Crude.....	6,268	5,383.4	2,748,071	510.47	1,322.6	738,195	558.14
Mill stock.....	135,475	130,119.0	4,435,028	34.08	11,917.0	477,289	40.05
	141,743	135,502.4	7,183,099	53.01	13,239.6	1,215,484	91.81
Asbestic.....		18,279.0	47,284	2.59			

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Rock mined.....	2,136,863		2,291,132		2,635,010		2,462,381	
" milled.....	1,795,472		1,822,461		2,260,191		2,185,572	
Output—								
Milled.....	102,572		112,832		135,475		139,143	
Crude.....	3,987		5,415		6,268		4,313	
	106,559		118,247		141,743		143,456	
Mill recovery %..	5.7		6.2		6.0		6.4	
Production—								
Asbestos.....	111,142	3,553,166	133,439	5,199,797	135,502	7,183,099	141,462	8,936,804
Asbestic.....	25,700	21,819	20,710	29,072	18,279	47,284	16,797	33,993
	136,842	3,574,985	154,149	5,228,869	153,781	7,230,383	158,259	8,970,797
Exports—								
Asbestos.....	84,584	2,734,695	96,775	3,872,463	93,932	4,903,326	119,454	7,786,710
Sand & waste.	25,103	157,410	33,564	241,272	52,088	430,956	22,144	228,059
Manufactures.		125,003		4,741		55,666		40,763
		3,017,108		4,118,476		5,389,948		8,055,532
Imports—		168,894		334,670		537,431		604,703

BARYTES.

Shipments of ground barytes in 1918 were 640 tons, valued at \$10,165 as compared with 3,490 tons valued at \$54,027 in 1917.

During recent years the only barytes deposit worked in Canada has been that at Lake Ainslie, Inverness County, N.S. In the Province of Ontario, however, a deposit located in Langmuir township, south of Porcupine, has been under development during the past few years by the Premier Langmuir Mines, Ltd., and shipments therefrom were made during 1918.

Imports of barytes are not separately shown in the Trade classification. There have been imports of barium peroxide for the manufacture of hydrogen peroxide amounting in 1918 to 53 tons valued at \$27,893 as compared with 73 tons valued at \$17,393 in 1917. There is also a small import of artificial sulphate of barium known as blanc fixé, the imports, however, being included with satin white. These imports in 1918 were 3,528 tons, valued at \$92,241.

Blanc fixé (barium sulphate) is artificially prepared by treating a solution of barium salt, generally the chloride with sulphuric acid, or aluminium sulphate. It is used for coating papers.

Satin white is an artificially prepared mineral for coating paper, consisting of precipitated calcium sulphate and alumina, prepared by grinding together the necessary proportions of alum and slaked lime with sufficient water.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production—								
Nova Scotia.....	550	6,875	1,368	19,393	3,490	54,027	580	9,145
Ontario.....							60	1,020
Imports—								
Barium peroxide	18	5,250	57	26,172	73	17,393	53	27,893
Blanc fixé and satin white.....	2,746	59,471	3,747	86,306	3,600	90,482	3,528	92,241

CHROMITE.

The production of chromite from the Eastern Townships, Province of Quebec, was supplemented in 1918 by small shipments from Cascade, a few miles southwest of Rossland, B.C. The total shipments of ores and concentrates from Canadian sources in 1918 were 21,994 short tons, valued at \$867,122, or an average of \$39.40 per ton, the total content of Cr_2O_3 , being 8,526 tons.

In 1917 the total shipments of ore and concentrates were 23,711 tons valued at \$581,796 or an average of \$24.54 per ton, with total Cr_2O_3 content of 8,472 tons. Thus the 1918 production while slightly less in tonnage of ore and concentrates shipped, really exceeded that of 1917 in chrome content and in total value.

The 1918 shipments included: Crude ore, 15,605 short tons, valued at \$456,408 or an average of \$28.45 per ton and with an average Cr_2O_3 content of 39.15 per cent; concentrates, 6,389 short tons, valued at \$410,714, or an average of \$64.28 per ton, and with an average Cr_2O_3 content of 49.01 per cent. The crude ore shipped included 1,850 tons sold for consumption in Canada, and 13,755 tons sold for export. The concentrates with the exception of about 2 tons were sold for export.

The 1917 shipments included 20,153 tons of ore and 3,558 tons of concentrates.

The production of chromite was undoubtedly stimulated by the control exercised by the War Trade Board and the appointment of Dr. Robert Harvie, of the Geological Survey, as resident agent of the Board at Black Lake. With the cessation of hostilities, however, the market collapsed, and during the last two months of the year practically all shipments were in fulfilment of contracts.

The outstanding features of the industry during the year were the increased production of concentrates which contributed 29 per cent of the shipments as against 15 per cent in 1917; the exceptionally high price which the product commanded—the average value of the crude ore shipped in 1918 being greater than the average value of all shipments in 1917; the development of ore reserves which appear to assure continued production provided economic conditions are favourable; and the entry of British Columbia as a producer of chrome ore.

The exports of chromite in 1918 as per Trade reports were 15,831 tons valued at \$353,616, or an average of \$22.32 per ton as compared with exports in 1917 of 19,229 tons valued at \$342,528, or an average of \$17.81 per ton.

Ferro-chrome has been imported into Canada but there is no separate record of the quantities thereof. The imports of bichromate of soda in 1918 were 1,046,490 pounds valued at \$208,669; and imports of bicromate of potash 20,844 pounds valued at \$10,686.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production (shipments):—		\$		\$		\$		\$
Crude ore.....	12,341	179,543	14,249	266,217	20,153	441,540	15,605	456,408
Concentrates.....			1,000	44,585	3,558	140,256	6,389	410,714
	12,341	179,543	15,249	310,902	23,711	581,796	21,994	867,122
Production:—								
Quebec.....	12,341	179,543	27,517	311,460	36,725	499,682	21,324	835,727
Br. Columbia.....							670	31,395
Exports.....	7,290	81,838	12,633	152,534	19,229	342,528	15,831	353,616
Imports:—								
Bichromate of soda.....	234	34,692	711	362,571	667	248,621	523	208,669
" potash.....	71.0	17,413	15.5	13,381	10.1	6,697	10.4	10,686

a Shipments as reported directly by operators in 1916 were 27,517 tons valued at \$311,460; and in 1917, 36,725 tons valued at \$499,682.

COAL AND COKE.

Coal.—The total production of marketable coal during 1918 (comprising sales, colliery consumption, and coal used in making coke, or used otherwise by colliery operators) was 14,977,926 short tons valued at \$55,192,896 or an average of \$3.68 per ton, and was, with the exception of the year 1913, the largest production obtained in any one year from Canadian coal mines.

The production in 1917 was 14,046,759 tons valued at \$43,199,831 compared with which the 1918 production shows an increase of 931,167 tons, or 6.63 per cent, and \$11,993,065, or 27.8 per cent in value.

The total output of coal including waste and unmarketable slack in 1918 was 15,460,385 tons as against 14,435,361 tons in 1917.

The 1918 production included 115,405 tons of anthracite, all from one mine in Alberta; 11,636,190 tons of bituminous coal, and 3,226,331 tons of lignite.

The increase in production of coal in 1918 has been obtained chiefly in the Province of Alberta although there were also substantial increases in British Columbia and in New Brunswick. The Nova Scotia production fell off 508,529 tons, or 8.0 per cent as compared with 1917. New Brunswick increased by 79,117 tons, or 41.8 per cent; Saskatchewan fell off 8,598 tons or 2.4 per cent; Alberta increased 1,236,448 tons, or 26.1 per cent and reached its highest production on record. British Columbia increased by 134,701 tons, or 5.5 per cent, but was less than the highest production in 1910 by 762,156 tons.

Output¹ and Production² of Coal by Provinces, 1918.

Province.	Average No. of men employed.	Wages Paid.	Production of Coal.				Output. Short tons.
			Short tons.	Per cent of total.	Value.	Average per ton.	
		\$		%	\$	\$	
Nova Scotia.....	10,361	13,069,322	5,818,562	38·85	21,095,470	3·63	5,836,370
New Brunswick.....	576	631,323	268,212	1·79	1,331,710	4·97	266,585
Saskatchewan.....	460	423,392	346,847	2·31	722,148	2·08	348,988
Alberta.....	9,032	11,382,406	5,972,816	39·88	20,537,287	3·44	6,126,443
British Columbia.....	4,982	7,384,358	2,568,589	17·15	11,494,681	4·47	2,879,099
Yukon Territory.....	8	8,700	2,900	0·02	11,600	4·00	2,900
Total	25,419	32,899,501	14,977,926	100·00	55,192,896	3·68	15,460,385

¹Output includes waste and unmarketable slack. ²Production includes sales, colliery consumption, and coal used by operators in making coke, or for other uses.

Monthly Production of Coal in Canada by Provinces, 1918 (in short tons).

Month.	Nova Scotia.	New Brunswick	Saskat- chewan.	Alberta.			British Columbia.	Total.
	(b)	(b)	(c)	(a)	(b)	(c)	(b)	
January.....	506,961	24,004	37,890	11,358	240,187	358,894	242,767	1,422,061
February.....	433,926	22,155	41,182	11,722	224,431	232,595	216,657	1,184,658
March.....	441,771	25,388	18,119	12,533	244,819	169,899	227,472	1,140,001
April.....	463,065	22,953	16,331	12,773	270,943	103,115	223,359	1,112,539
May.....	473,504	23,624	21,947	10,927	260,778	147,106	227,361	1,165,247
June.....	480,857	23,783	24,480	8,732	260,689	233,891	229,288	1,260,720
July.....	489,395	18,886	29,266	9,932	269,346	271,504	227,467	1,315,796
August.....	516,218	28,611	24,433	9,006	270,137	279,231	231,200*	1,361,736
September.....	494,113	24,277	25,899	8,611	264,216	264,766	147,689	1,229,571
October.....	586,904	18,064	31,706	8,211	263,845	283,446	211,548	1,403,724
November.....	478,584	17,806	38,514	4,947	189,134	250,291	176,616	1,155,892
December.....	451,264	18,661	38,080	6,653	219,412	284,746	207,165	1,225,981
Total	5,818,562	268,212	346,847	115,405	2,977,927	2,879,484	2,568,589	*14,977,926

*Includes 2,900 tons produced in the Yukon district. (a) anthracite; (b) bituminous; (c) lignite.

	1915.		1916.		1917.		1918.	
	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.
		\$		\$		\$		\$
Output.....	13,480,196	.....	14,815,703	....	14,435,361	.....	15,460,385	.....
Production: by provinces—								
Nova Scotia.....	7,463,370	16,659,308	6,912,140	18,514,662	6,327,091	19,410,737	5,818,562	21,095,470
N. Brunswick.....	127,391	309,612	143,540	386,016	189,095	708,010	263,212	1,331,710
Saskatchewan.....	240,107	365,246	281,300	441,836	355,445	662,451	346,847	722,148
Alberta.....	3,360,818	8,283,079	4,559,054	11,386,577	4,736,368	14,153,685	5,972,816	20,537,287
B. Columbia.....	2,063,613	6,455,041	2,584,361	8,075,190	2,433,888	8,235,716	2,568,589	11,494,681
Yukon.....	9,724	38,896	3,300	13,200	4,872	29,232	2,900	11,600
	13,267,023	32,111,182	14,483,395	38,817,481	14,046,759	43,199,831	14,977,926	55,192,896
Production: by kinds—								
Anthracite.....	11,483,791	27,887,776	12,212,071	33,121,789	108,225	35,359,920	115,405	44,967,894
Bituminous.....	1,783,232	4,223,406	2,271,324	5,695,692	11,154,251	7,839,911	11,636,190	10,225,002
Lignite.....					2,784,283		3,226,331	
Imports—								
Bituminous (1).....	6,106,794	7,564,369	9,504,552	12,368,679	12,407,486	33,712,894	13,656,360	37,291,057
Bituminous (2).....	2,286,916	2,027,256	3,505,236	3,704,624	3,129,776	8,739,877	3,237,067	8,351,639
Anthracite.....	4,072,192	18,753,980	4,570,815	22,216,363	5,320,198	28,109,586	4,785,160	26,007,688
	12,465,902	28,345,605	17,580,603	38,289,666	20,857,460	70,562,357	21,678,587	71,650,584
Exports—								
The produce of Canada.....	1,766,543	5,406,058	2,135,359	7,099,387	1,733,156	7,387,192	1,817,195	9,405,423
All other.....	59,690	86,059	62,783	150,799	47,328	173,176	67,486	205,339
Consumption.....	23,906,692	54,964,670	29,865,856	69,856,961	33,123,735	106,201,820	34,771,832	117,232,668

(1) Round and run-of-mine. (2) Slack such as will not pass through 3" screen.

Coke. The accompanying statistics cover only the production of coke in by-product and Beehive coke oven plants and do not include retort coke recovered by gas companies.

Both domestic and imported coal are used in the manufacture of coke in Canadian coke oven plants.

The total output during 1918 was 1,258,284 short tons made from 1,983,242 tons of coal of which 1,348,232 tons were of domestic origin and 635,010 tons imported. The output thus averaged 0.634 tons of coke per ton of coal charged. The total coke used, or sold by producers during the year was 1,250,744 tons valued at \$11,035,195 or an average of \$8.82 per ton.

By provinces the output was: Nova Scotia 581,870 tons, a decrease of 63,199 tons; Ontario 431,970 tons, an increase of 56,956 tons; Alberta 32,801 tons, an increase of 1,605 tons; and British Columbia 211,643 tons, an increase of 31,057 tons.

The ovens operated during the year were those at Sydney, and Sydney Mines, N.S.; Sault Ste. Marie, and Hamilton, Ont.; Coleman, Alta.; and Fernie, Michel, and Union Bay, B.C.

At the close of the year 1,640 ovens were in operation; 1,041 were idle and 115 were in course of construction. These last included 60 Koppers ovens at Sydney, 25 Williputte ovens at Sault Ste. Marie and 30 Lomax regenerative ovens at Anyox, B.C.

The exports of coke in 1918 were 29,612 tons, valued at \$223,629 or an average of \$7.55 per ton, as against exports in 1917 of 23,595 tons valued at \$137,318 or an average of \$5.82 per ton. The imports of coke in 1918 were 1,165,590 tons valued at \$8,975,445 or an average of \$7.70 per ton, as against imports in 1917 of 970,106 tons valued at \$6,517,260 or an average of \$6.72 per ton.

The estimated consumption of oven coke in 1918 was 2,386,722 tons as compared with 2,192,373 tons in 1917.

Of the total output of coke 879,063 tons, or 70 per cent was made in by-product recovery ovens and the recovery of by-products included: ammonium sulphate 10,825 tons, and tar 8,009,327 gallons, as against 9,941 tons of ammonium sulphate and 8,277,078 gallons of tar in 1917.

	1915.		1916.		1917.		1918.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Coal charged:		\$		\$				\$
Domestic	1,425,172	.....	1,501,835	.....	1,379,088	.....	1,348,232	.....
Imported	431,221	.....	633,076	.....	549,885	.....	635,010	.....
Total	1,856,393	.....	2,134,911	.....	1,928,923	.....	1,983,242	.....
Output: coke	1,200,766	.....	1,448,782	.....	1,231,865	.....	1,258,284	.....
Recovery	64.7	.....	67.9	.....	63.9	.....	63.4	.....
Production:								
Nova Scotia	585,873	1,905,766	654,433	2,617,732	643,757	3,218,785	580,433	5,966,609
Ontario	285,251	1,141,004	472,507	2,008,155	359,048	2,155,326	425,087	3,300,127
Alberta	23,826	95,304	41,950	167,800	31,649	181,982	32,564	213,884
Br. Columbia	275,523	1,116,506	300,851	1,255,725	181,438	1,106,488	212,570	1,594,575
Total	1,170,473	4,258,530	1,469,741	6,049,412	1,245,862	6,662,581	1,250,744	11,035,195
Exports	35,869	160,053	48,539	221,334	23,595	137,318	29,612	223,629
Imports	637,857	1,608,464	757,116	2,229,078	970,106	6,517,360	1,165,590	8,975,445
Consumption	1,772,461	5,706,991	2,178,318	8,057,156	2,192,373	13,042,523	2,386,722	19,787,011
By-products—								
Ammonium Sulphate—								
Production	10,448	.....	11,040	.....	9,941	.....	10,825	.....
Imports	251.6	14,637	119.5	9,572	233.5	26,662	4.2	1,273
Exports (a) .....	.....	.....	.....	.....	8,047	693,377	8,696	1,027,558
Tar—								
Production	7,365,981	.....	9,012,202	50,352	8,277,078	43,547	8,009,327	67,646
Exports	4,089,602	37,331	5,058,636	.....	3,963,826	.....	4,699,009	.....
Gas .....	.....	.....	1,907	.....	1,657	.....	1,640	.....
Ovens in operation Dec. 31 .....	.....	.....	.....	.....	.....	.....	.....	.....

(a) Not separately shown previous to April, 1917.

FELDSPAR.

The shipments of feldspar in 1918 were 18,782 tons valued at \$112,728 or an average of \$6 per ton, as compared with shipments in 1917 of 19,462 tons valued at \$89,826, or an average of \$4.62 per ton.

The greater part of the feldspar shipped from Canadian mines is marketed with the pottery manufacturers in the United States. The production comes chiefly from the counties of Frontenac and Lanark in Ontario and the counties of Ottawa and Labelle in Quebec.

The exports of feldspar during the year were valued at \$101,187.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production :		\$		\$		\$		\$
Quebec	572	2,005	4,610	18,075	1,188	8,204	191	4,279
Ontario	13,987	55,796	14,878	53,332	18,274	81,622	18,591	108,449
	14,559	57,801	19,488	71,407	19,462	89,826	18,782	112,728
Exports (a)						69,195		101,187

(a) Not separately stated prior to April, 1917.

FLUORSPAR.

The production of fluorspar again shows a substantial increase. The principal production from Madoc, Ontario, was supplemented by shipments from a recently opened deposit in Yale district, of British Columbia.

The total shipments during 1918 were 7,362 tons valued at \$156,029 as compared with 4,249 tons valued at \$68,756 in 1917.

Eight properties were operated in the Madoc district and the average value of the shipments was \$20.97 as compared with \$16.08 in 1917. Prices varied with the grade of the product from \$15 to \$30 per ton. In addition to the Madoc shipments, a small tonnage is reported to have been mined in the township of Cardiff.

The Consolidated Mining and Smelting Company is operating the "Rock Candy" fluorspar deposit on Kennedy creek, Kettle river, near Grand Forks, B.C. The Company reports very favourable indications for a large tonnage in excess of their own requirements, for export.

Canadian steel companies use from 10,000 tons to 15,000 tons per annum.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production :		\$		\$		\$		\$
Ontario	nil.	nil.	1,284	10,238	4,249	68,756	7,187	150,779
British Columbia							175	5,250
	nil.	nil.	1,284	10,238	4,249	68,756	7,362	156,029
Imports :								
Hydro-fluo-silicic acid	558.9	36,085	448.2	28,611	0.2	97	0.5	80

-GRAPHITE.

Notwithstanding the importance of this product as a "war mineral" and the strong demand therefor, the production of graphite in 1918 was considerably less than in 1917. The total shipments were 3,114 tons, valued at \$248,870, as against 3,714 tons, valued at \$402,892 in the previous year.

By provinces the 1918 shipments included 2,934 tons, valued at \$208,852, from Ontario, and 180 tons, valued at \$40,018, from Quebec (including a small shipment from Baffin Land).

In 1917 Ontario contributed 3,173 tons, valued at \$296,587, and Quebec and Baffin Land 541 tons, valued at \$106,305.

The quantity of ore milled during the year was 11,358 tons, from which was produced 3,225 tons of milled, or refined graphite.

The total quantity of ore milled during the year 1917 was 19,614 tons, from which were produced 4,003 tons of refined, or milled graphite. From three mills operating on disseminated flake ores, the average recovery of refined graphite was 5.5 per cent in 1918 and 8.6 per cent in 1917 of the rock milled. The Black Donald (Calabogie, Ont.) ore consists largely of amorphous graphite, from which a large mill recovery is made.

Graphite operators reported that of the total shipments, 2,856 tons, valued at \$214,345, were sold for export. Trade records show exports of plumbago, crude ore and concentrate, 664 tons, valued at \$32,710, and manufactures of plumbago (probably refined) valued at \$205,993, a total export of \$238,703.

By grades the shipments included 366 tons of No. 1 flake, valued at \$97,518, or an average of \$266.44 per ton; 73 tons of No. 2 flake, valued at \$13,780, or an average of \$188.77 per ton; and 2,675 tons of No. 3 and dust, valued at \$137,572, or an average of \$51.43 per ton.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Ore milled.....	6,680	.....	23,199	.....	19,614	.....	11,358	.....
Output, milled graphite..	1,901	.....	4,133	.....	4,003	.....	3,225	.....
Production:—								
No. 1 Flake.....					540	158,656	366	97,518
No. 2 ".....					650	99,621	73	13,780
No. 3 " and dust..					2,524	144,615	2,675	137,572
	2,635	124,223	3,955	325,362	3,714	402,892	3,114	248,870
Exports:—								
Crude ore and concen-								
trates.....	263	12,009	311	13,114	112	7,455	664	32,710
Manufactures.....		84,316		304,919		384,505		205,993
Imports:—								
Plumbago, not ground..		3,436		3,231		47,218		93,956
Ground and manufac-		41,681		99,919		123,991		132,821
tures.....								
Crucibles: clay, or plum-		106,761		520,341		798,044		113,856
bago.....								
		151,878		623,491		969,253		340,633

Artificial Graphite.—Artificial graphite is manufactured in electric furnaces at Niagara Falls, Ontario, by the International Acheson Graphite Company. The annual production has been as follows:—

Calendar Year.	Pounds	Calendar Year.	Pounds.	Calendar Year.	Pounds.
1906.....	445,047	1911.....	2,172,098	1915.....	497,271
1907.....	407,779	1912.....	2,302,625	1916.....	525,048
1908.....	428,510	1913.....	2,184,472	1917.....	1,096,172
1909.....	513,436	1914.....	1,234,239	1918.....	1,808,698
1910.....	2,442,166				

GYPSUM.

Because of the general cessation of building activities during the war the production of gypsum has fallen in 1918 to less than one-fourth the tonnage mined in 1913. The difficulties in securing boat transportation for shipments from the Maritime Provinces was a contributory cause of decreased output. The total quantity of gypsum rock quarried in 1918 was 155,298 tons, of which 88,748 tons were calcined. The shipments of all grades totalled 152,287 tons valued at \$823,006 and included: lump gypsum 43,728 tons valued at \$47,727; crushed, 25,074 tons valued at \$55,079; fine ground, 4,558 tons valued at \$12,621, and calcined, 78,927 tons valued at \$707,579. By provinces the shipments were: Nova Scotia, 49,365 tons valued at \$115,976; New Brunswick, 27,225 tons valued at \$214,114; Ontario, 38,214 tons valued at \$151,564; Manitoba, 37,483 tons valued at \$341,352.

The average number of men employed in 1918 was 435 and wages paid, \$275,312, as compared with 774 men employed and \$445,128 paid in wages in 1917.

Exports of crude gypsum were 67,824 tons valued at \$80,843, and of gypsum ground valued at \$101,618.

The imports of gypsum of all grades during 1918 were valued at \$22,065 and included: crude gypsum, 112 tons valued at \$2,015; ground gypsum, 79 tons valued at \$1,836, and plaster of Paris, 1,095 tons valued at \$18,214.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Ore, mined.....	505,989		424,431		365,659		155,298	
Ore, calcined.....	84,763		94,414		97,667		88,748	
Production—								
Lump.....	346,947	375,815	249,893	263,050	223,760	246,774	43,728	47,727
Crushed.....	48,735	67,007	15,680	28,111	32,305	51,869	25,074	55,079
Fine ground.....	6,455	22,767	6,096	19,673	4,843	19,222	4,558	12,621
Calcined.....	72,678	389,340	71,246	427,759	75,424	564,119	78,927	707,579
	474,815	854,929	342,915	738,593	336,332	881,984	152,287	823,006
Production by Provinces—								
Nova Scotia.....	298,864	339,857	233,212	278,160	215,472	301,261	49,365	115,976
New Brunswick.....	74,501	184,929	39,546	153,064	38,556	191,631	27,225	214,114
Ontario.....	81,172	190,422	36,668	116,086	48,947	130,188	38,214	151,564
Manitoba.....	20,278	139,721	28,489	191,283	33,347	258,934	37,483	341,352
British Columbia.....					10	20		
Exports—								
Crude.....	292,234	336,380	221,156	252,476	224,423	245,182	67,824	80,843
Ground.....		80,933		154,630		146,384		101,618
		417,313		407,106		391,566		182,461
Imports—								
Crude.....	1,799	7,734	3,022	14,358	64	999	112	2,015
Ground.....	134	2,253	282	3,404	282	5,355	79	1,836
Plaster of Paris.....	2,442	15,832	3,786	25,529	3,101	29,166	1,095	18,214
	4,375	25,819	7,090	43,291	3,447	35,460	1,286	22,065

MAGNESITE.

The production of magnesite—obtained from the deposits in Argenteuil county, Quebec—is marketed as crude ore, calcined and dead burnt clinker (the latter being sintered in rotary kilns after mixture with about 5 per cent of iron ore in the form of magnetite). The total shipments in 1918 were 39,365 tons, valued at \$1,016,765, as compared with shipments in 1917 of 58,090 tons, valued at \$728,275.

The smaller tonnage shipped in 1918 is due to the greater proportion of calcined and dead burnt clinker produced and sold. There were marketed about 16,697 tons of crude ore valued at \$158,380, averaging about \$9.50 per ton. Calcined material sold at \$25 per ton and dead burnt clinker, between \$35 and \$40.

In 1918 about 57,799 tons of magnesite rock were quarried and about 49,303 tons were calcined in lime kilns, or sintered in rotary cement kilns. The sintering was done at the plants of the Canada Cement Company at Hull and Montreal.

Exports of magnesite in 1918 were valued at \$816,553.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Ore mined.....	18,161		57,300		64,767		57,799	
" calcined.....	(c)		4,666		11,401		49,303	
Production—								
Crude ore.....			53,080	491,947	52,711	528,260	16,697	158,380
Calcined and dead burnt..	{ 14,779	126,584	{ 2,333	71,882	5,379	200,015	22,668	858,385
	14,779	126,584	(b) 55,413	563,829	58,090	728,275	39,365	1,016,765
Exports (a)						72,228		816,553
Imports, magnesite.....	91	9,695	195	20,651	58	16,186	47	13,200

(a) Not separately shown prior to April, 1917.

(b) Includes shipments of 635 tons valued at \$9,525 from Atlin, B.C.

(c) Not reported.

Metallic Magnesium.—The manufacture in Canada of metallic magnesium has been undertaken by the Shawinigan Electro Metals Company, Ltd., at Shawinigan Falls, Que. The metal is made from magnesium chloride salts which have been imported.

Magnesium Sulphate.—Sulphate of magnesium, epsomite, or crude Epsom salt has been found in several localities in southern British Columbia.

Commercial shipments have been made during the past few years from a deposit near Kruger mountain, Osoyoos division, B.C., where the mineral is found in a flat depression known as Spotted Lake, which is a partially dried-up lake containing alternate circles of water and dry places. The Stewart Calvert Company, Inc., of Oroville, Washington, has been operating this deposit. The crude magnesium sulphate salt is hauled to the company's works at Oroville, where the crude salt is refined and prepared for the market. Shipments in 1916 were reported as 250 tons, and in 1915 about 300 tons.

In addition to the Spotted Lake deposit the same company also made shipments during 1918 from a deposit near Clinton, in Lillooet, B.C.

The greater part of the refined salt is used for industrial purposes, the tanning industry probably taking the largest proportion, though considerable amounts are also used in the textile industries and in the manufacture of dyes. About 20 per cent of the total shipments go to the drug trade.

Several lakes containing these salts have been observed on the Basque ranch, near Ashcroft, and investigations of their probable commercial value are being made.

	1917.		1918.	
	Tons.	Value.	Tons.	Value.
		\$		\$
Quantity extracted.....	2,600		4,500	
Quantity shipped	929	4,645	1,949	14,565

MANGANESE.

The production of manganese ore in Canada has been small and irregular. During 1918 operations were discontinued at New Ross, in Nova Scotia, but shipments were made during the year from Kaslo, B.C., amounting to 440 tons (dry), valued at \$6,230.

The manganese ores which have been mined in Canada are pyrolusite, manganite, psilomelane, and bog manganese. These were mostly ores with a high manganese content, and fairly free from deleterious constituents. The largest part of the production was consequently put to those uses, where a high grade raw material is desired, e.g., as an oxidizing agent in the manufacture of chlorine, bromine, manganates, and permanganates; as decolorizer of glass, porcelain, and enamels; as a colouring material in dyeing and pottery and paint manufacture; as a drier in paints and varnishes, and in the manufacture of dry and Leclanche cells, etc.

No separate record of imports of manganese ore is kept in the Trade classification but statistics of oxide of manganese are given. In 1918 these imports were 1,068 tons, valued at \$93,477. Imports of ferro-silicon, spiegeleisen and ferro-manganese in 1918 were 35,284 tons, valued at \$4,283,133. The exports in 1918 were 784 tons, valued at \$29,208.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production:		\$		\$		\$		\$
Nova Scotia.....	51	5,760	646	70,371	158	14,836		
New Brunswick.....	150	3,600	311	19,173				
British Columbia.....							440	6,230
	201	9,360	957	89,544	158	14,836	440	6,230
Imports:								
Manganese oxide.....	1,238	46,678	1,170	63,786	1,709	92,616	1,068	93,477
Ferro-silicon, spiegeleisen and ferro-manganese	13,758	807,312	14,777	1,879,538	12,828	2,029,990	35,284	4,283,133
Exports:								
Manganese ore.....	255	6,855	957	89,544	185	16,031	784	29,208
Ferro-silicon and compounds.....	9,238	537,081	22,802	1,352,013	33,212	2,616,924	23,781	2,671,434

MICA.

The total shipments of mica by mine operators in 1918 were 747 tons, valued at \$271,550, or an average of \$363.52 per ton. By provinces the production was: from Quebec, 481 tons, valued at \$229,119, or an average of \$476.39 per ton; Ontario, 266 tons, valued at \$42,431, or an average of \$159.52 per ton.

The statistics as to value of production should be considered with due regard to the conditions under which the industry is conducted. The condition in which mica is shipped from the mines varies greatly; one operator may ship his output cleaned and trimmed, while the output of another is in a rough cobbled state, with consequent noteworthy difference in prices realized. And further, companies operating trimming shops as well as mines may place only a nominal value on shipments from mines to trimming shops.

Canada's production of mica has come exclusively from two fields: one in the Province of Quebec, a short distance north of the city of Ottawa, and the other embracing parts of the counties of Lanark, Leeds, and Frontenac, in the Province of Ontario. The city of Ottawa (and the adjacent city of Hull), lying between these two fields, is the centre to which almost all the production of the various mines and numerous small prospects is shipped for trimming, grading, and marketing. In preparation for the market a considerable proportion of the tonnage received is cobbled out and the mica split, trimmed, and otherwise manufactured, with the result that the exports, though of smaller tonnage than the shipments from the mines, usually exceed them in total value.

According to Trade records the exports of mica in 1918 were 433 tons, valued at \$410,000.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production :		\$		\$		\$		\$
Quebec	217	50,390	844	192,343	774	286,730	481	229,119
Ontario	200	41,515	364	62,896	392	72,121	266	42,431
	417	91,905	1,208	255,239	1,166	358,851	747	271,550
Exports	440	236,124	654	379,720	636	451,345	433	410,000

MINERAL PIGMENTS (IRON OXIDES).

For many years there has been an annual production in the Province of Quebec of iron oxide from deposits situated between Champlain and Three Rivers, a short distance from the St. Lawrence river.

These oxides are marketed after calcining, as paint materials and are also sold crude for use in the purification of illuminating gas. The mineral paint is calcined, washed, and fine ground before shipment.

There was a small production included in the total for 1917, of zinc oxide for use as a pigment, the production being obtained at the oxide plant of the Canadian Zinc Products Co., Ltd., at Notre-Dame-des-Anges. There was no production during 1918.

The total production of iron oxide was 17,317 tons valued at \$112,440.

The exports of mineral pigments, iron oxides, ochres, etc., in 1918 are reported as 769 tons valued at \$18,377.

Imports of mineral pigments are included under two classifications (1) ochres and ochrey earths, siennas and umbers, duty 20 per cent, and (2) oxides, roughstuffs, fillers, fireproofs and colours, dry, n.e.s., duty 25 per cent. During 1918 imports under the first classification were 1,560 tons valued at \$66,011 and under the second classification 2,460 tons valued at \$409,841, or a total import of 4,020 tons valued at \$475,852.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production.....	6,248	48,353	8,811	58,711	9,409	87,605	17,317	112,440
Imports:—								
Ochrey earths.....	1,240	23,763	2,082	51,771	1,956	59,864	1,560	66,011
Oxides.....	2,452	260,986	2,917	357,487	2,538	357,638	2,460	409,841
Exports: (a).....	1,196	17,263	1,696	25,312	1,451	30,052	769	18,377

(a) Mineral pigments, iron oxides and ochres.

MINERAL WATER.

The statistics of production given herewith represent, as usual, as closely as can be ascertained, the value of mineral water shipped from mineral springs in bottles, barrels, or other containers, and do not include any estimate of the value of mineral water used at springs for drinking or bathing purposes; nor are the natural pure spring waters included, of which a considerable quantity is sold in bottled form.

The value of the production in 1918 was \$154,468 as compared with \$145,814 in 1917; of the 1918 production, Quebec is credited with \$7,609, Ontario \$145,400, British Columbia \$1,455, and Saskatchewan \$4.

The imports of mineral and aerated waters during the calendar year 1918 were valued at \$105,967, being 1,900 gallons of natural mineral water valued at \$634; and aerated water valued at \$105,333. The exports of mineral water during the same year were valued at \$20,214, of which 55 gallons valued at \$41 was for natural mineral water and \$20,173 for bottled aerated water.

	1915.		1916.		1917.		1918.	
		Value.		Value.		Value.		Value.
		\$		\$		\$		\$
Production.....		115,274		127,806		145,814		154,468
Imports.....		126,569		130,933		108,444		105,967
Exports.....		3,578		1,598		10,765		20,214

NATURAL GAS.

The total production of natural gas in Canada in 1918 was 20,140,309 thousand cubic feet valued at \$4,350,940, of which Ontario contributed 13,029,524 thousand cubic feet valued at \$2,884,460; Alberta 6,318,389 thousand cubic feet valued at \$1,358,638, and New Brunswick 792,396 thousand cubic feet valued at \$107,842. The large falling off in the Ontario production was due to legislation prohibiting the use of natural gas for industrial purposes and thus conserving for domestic supply only.

The value of the gas, as reported by producers, varies from 5 cents to 30 cents per thousand feet, but these prices do not represent what the consumer has to pay. In some cases the producer also owns the distribution pipe line and receives the full price paid by the consumer. In other cases the producer may sell to a pipe line company who either sells directly to consumers, or may in turn resell to other pipe line companies for retail distribution; in such cases as these the producer receives only a fraction of the amount paid by the consumer, but he is saved the expense of distribution. The statistics given herewith represent, as far as possible, the value received by the producer, or owner, of the gas wells, whether such producer be the owner of the distribution line or not.

Natural Gas Production, 1915-16-17.

	1915.		1916.		1917.	
	M. cu. ft.	Value.	M. cu. ft.	Value.	M. cu. ft.	Value.
		\$		\$		\$
Production:	430,692	60,383	610,118	79,628	796,775	103,735
New Brunswick.....	15,211,523	2,622,838	17,953,109	2,765,105	19,868,035	3,641,587
Ontario.....	4,481,947	1,022,814	6,904,231	1,113,296	6,744,130	1,299,976
Alberta.....						
	20,124,162	3,706,035	25,467,458	3,958,029	27,408,940	5,045,298

Natural Gas Production, 1918.

Province.	No. of operators.	No. Men.	Wages.	Wells, 1918.						Production.		
				(a)	(b)	(c)	(d)	(e)	(f)	M. cu. ft.	Value.	Average.
			\$								\$	\$
Quebec.....			6	.....	.....	.....	.....	6	.....	.....	.....	.....
New Brunswick.....	1	21	27,683	23	.....	4	.....	22	1	792,396	107,842	0.136
Ontario.....	83	510	449,545	1882	62	24	118	1891	9	13,029,524	2,884,460	0.221
Saskatchewan.....						1	.....		1	.....	.....	.....
Alberta.....	17	180	164,314	69	5	.....	.....	74	5	6,318,389	1,358,638	0.215
Total.....	101	711	641,542	1980	67	29	118	1993	16	20,140,309	4,350,940	0.216

- (a) Total number of productive wells at beginning of year.
 (b) Number of productive wells drilled during year.
 (c) " dry wells drilled during year.
 (d) " wells abandoned during year.
 (e) " productive wells at end of year.
 (f) " wells on which drilling was in progress at end of year.

PEAT.

No shipments of peat have been reported since 1916. During the latter year about 300 tons, valued at \$1,500, were shipped from a bog in Middlesex county, Ontario. In 1915 shipments were made from the Alfred bog, Prescott county, amounting to 300 tons, valued at \$1,050.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production	300	\$ 1,050	300	\$ 1,500		\$		\$

PETROLEUM.

The past two years have witnessed slight increases in petroleum production, due to the development of the new Mosa field in the county of Middlesex, in Ontario, so that the production in 1918 was not only 90,909 barrels, or 42 per cent in excess of that of 1917, but was the largest production that has been reached since 1910. A bounty of 1½ cents per gallon is paid on the marketed production of crude oil from Canadian oil fields, the administration of the "Petroleum Bounty Act" being under the Department of Trade and Commerce. According to the bounty record the production in 1918 in Ontario was 288,692 barrels (10,104,220 imperial gallons) which at the average price per barrel of \$2.694 was worth \$777,737. The New Brunswick production according to bounty payments was 3,009 barrels worth about \$7,402 or an average value of \$2.46. For five years there has been a small but growing production of crude petroleum in Alberta, the greater part of which, however, does not earn the bounty because of its lightness, or low specific gravity. The approximate production in 1918 was 13,040 barrels valued at \$100,004.

The total production in Canada from all sources was therefore 304,741 barrels (10,665,935 imperial gallons) valued at \$885,143.

The price of crude oil at Petrolia was quoted at \$2.48 from August 20, 1917 to February 12, 1918 when the price was increased 10 cents to \$2.58. On March 21, the price was again increased by 10 cents to \$2.68, and on July 10, to \$2.78 remaining at this price to the end of the year. The average monthly price for the year was thus \$2.69½, as against an average of \$2.33½ in 1917; \$1.98 in 1916, and \$1.39½ in 1915.

The production in barrels of the various fields in the Province of Ontario as kindly furnished by the Supervisor of Petroleum Bounties at Petrolia was as follows: Petrolia and Enniskillen 65,467; Oil Springs 44,671; Moore township 6,367; Sarnia township 3,438; Plympton township 412; Bothwell 29,116; Tilbury 25,228; Dutton 1,875; Onondaga 1,186; Belle River 447; Mosa township 108,988; Thamesville 1,566.

The production in New Brunswick is all obtained in the Stoney Creek district, Albert Co. The Alberta production was obtained from 5 wells situated in the Turner Valley field, near Black Diamond, about 35 miles southwest of Calgary.

In 1918 ten oil refineries in Canada used 262,641,155 gallons of crude oil of which 250,382,965 gallons were imported, and 12,258,190 gallons were obtained from Canadian wells. The production of refined oils and petroleum products included gasoline

and motor oils 72,175,768 gallons; benzoline, benzene, and other light oils, 1,530,592 gallons; illuminating oils 65,268,598 gallons; lubricating oils 14,402,523 gallons; gas and fuel oils and tar 79,092,347 gallons; wax and candles 13,759,972 pounds. There was also a production of asphalt and other products. The total value of the products of refineries was \$37,287,891.

According to inspection returns of the Inland Revenue Department the total quantity of illuminating oils inspected during the calendar year 1918 was 55,443,056 gallons and the quantity of naphtha or gasoline and other light oils was 74,310,352 gallons.

Exports of petroleum entered as crude mineral oil in 1918 were 270,302 gallons valued at \$28,415 and of refined oil 1,946,967 gallons valued at \$206,675. There was also an export of naphtha or gasoline of 91,229 gallons valued at \$28,778.

The total value of the imports of petroleum and petroleum products in 1918 was \$30,749,570 as against a value of \$22,957,688 in 1917.

The total quantity of petroleum oils, crude and refined, imported in 1918 was 420,728,933 gallons as compared with 379,148,006 gallons in 1917. A detailed record will be found in the accompanying tables.

Oil Wells and Oil Shipments, 1918.

Province.	Men Em- ployed.	Wages paid.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Oil Shipped.		
										Barrels.	Value.	Average. Value.
		\$									\$	\$
New Brunswick.	*	*	7	...	...	...	...	7	...	3,009	7,402	2.46
Ontario (not complete).	246	173,777	4,014	67	0	1	302	3,821	1	288,692	777,737	2.69
Alberta.	18	21,364	5	9	...	...	...	8	15	13,040	100,004	7.67
Br. Columbia.									1			
Total.....	264	195,141	4,026	76	0	1	302	3,836	17	304,741	885,143	2.90

* Included with natural gas statistics.

(a) Number of productive wells at beginning of year.

(b) Number of oil wells drilled during year.

(c) Number of gas wells drilled during year.

(d) Number of dry wells drilled during year.

(e) Number of wells abandoned during year.

(f) Total number of productive wells at end of year.

(g) Number of wells on which drilling was still in progress at end of year.

Petroleum.

	1915.		1916.		1917.		1918.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Bounty paid.....		\$ 112,577		\$ 104,014		\$ 107,799		\$ 153,958
Production, crude—								
New Brunswick.....	1,020	1,423	1,345	2,663	2,341	5,460	3,009	7,402
Ontario.....	214,444	299,149	196,778	389,621	202,991	473,477	288,692	777,737
Alberta.....	small		small		8,900	63,302	13,040	106,004
Production, refinery—	215,464	300,572	198,123	392,284	213,832	542,239	304,741	885,143
Refined oils.....								
Other products (n).....					173,235,606	23,575,358	232,469,829	35,372,773
Refined oils inspected *—						1,561,785		1,915,088
Petroleum.....	33,091,567					25,137,143		37,287,861
Naphtha.....	26,830,499		34,155,473		41,366,586		55,443,056	
			38,249,129		59,892,046		74,310,352	
	59,922,066		72,404,602		101,258,632		129,753,408	
Exports—								
Coal and kerosene, crude.....	35,977	1,789	137,647	11,439	2,130	183	270,302	28,415
" refined.....	103,488	14,107	446,595	48,137	28,212	6,558	1,946,967	206,677
Gasoline and naphtha.....	16,644	4,540	54,806	14,194	24,304	7,419	91,229	28,778
	156,109	20,436	639,043	73,770	54,646	14,160	2,308,498	263,868
Imports—								
(a) Crude (1) for refining.....	192,548,743	3,675,253	252,895,361	8,448,778	183,105,102	8,411,730	229,010,561	13,359,636
" (2) all other.....					142,524,473	5,998,930	148,537,043	8,355,387
(b) " gas oils.....	39,744	2,768	197,909	11,044	854,778	65,404	65,845	7,584
(c) Coal and kerosene, distilled.....	6,658,460	348,444	7,912,419	474,442	13,258,815	978,366	5,241,881	526,606
(d) Illuminating.....	134,413	56,575	167,688	66,451	198,281	115,194	200,889	152,825
(e) Lubricating.....	3,678,253	488,215	4,239,675	597,783	3,438,430	559,605	2,450,588	476,641
" Lubricating, n.o.p.....	267,390	267,390	1,226,401	375,320	1,877,381	630,325	2,849,051	1,203,130
Gasoline.....	28,030,972	2,693,717	18,321,891	3,624,931	15,369,172	8,293,760	3,121,982	798,387
(f) Products, n.o.p.....	4,354,254	446,972	7,464,777	1,003,577	18,521,574	2,708,395	29,246,143	5,595,425
	236,913,765	7,979,264	292,426,121	14,604,476	379,148,006	22,741,709	420,728,983	30,475,621

Paraffin wax.....	Lbs.	756,234	40,965	1,061,112	70,368	1,020,634	140,722	1,755,422	209,916
" candles.....	"	224,428	27,552	220,264	30,539	513,337	73,257	327,657	64,033
"	"	980,662	68,517	1,281,376	100,847	2,133,971	215,979	2,083,079	273,949

(a) (1) Crude petroleum in its natural state .7900 specific gravity or heavier at 60 degrees temperature, when imported by oil refineries to be refined in their own factories. (2) Petroleum (not including crude petroleum imported to be refined, or illuminating or lubricating oils) .8235 specific gravity or heavier at 60 degrees temperature.

(b) Crude petroleum, gas oils (other than benzene, naphtha and gasoline.)

(c) Coal and kerosene, distilled, purified, or refined.

(d) Illuminating oils composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon.

(e) Lubricating oils composed wholly or in part of petroleum, costing less than 25 cents per gallon.

(f) Products of petroleum, n.o.p.

(n) Including wax, candles, and asphalt. (See table following.)

* Department of Inland Revenue returns.

REFINERY STATEMENT.

	1917.		1918.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
No. men employed, wages.....			2,934	3,439,394
Crude oil receipts—				
Canadian.....Gals.	7,487,366	577,985	12,258,190	918,332
Imported....."	201,434,568	14,764,954	250,382,965	22,789,768
	208,921,934	15,342,939	262,641,155	23,708,100
Materials used—				
Crude oil, Canadian.....Gals.	8,434,059		10,039,645	
" imported....."	190,822,740		250,170,254	
Sulphuric acid.....Lbs.	31,738,514		37,866,316	
Soda and alkali....."	1,803,946		2,179,620	
Litharge....."	105,612		97,319	
Sulphur....."	29,785		52,302	
Other material....."	1,050,520		382,672	
Output—				
Gasoline and motor oils.....Gals.	54,114,786	13,502,313	72,175,768	19,249,169
Benzoline, benzene and other petrol spirits....."			1,530,592	384,927
Illuminating....."	49,144,564	4,513,912	65,268,598	7,130,517
Lubricating....."	14,332,549	1,969,658	14,402,523	2,571,691
Fuel and gas oils, tar....."	55,643,707	3,589,475	79,092,347	6,036,469
Wax and candles.....Lbs.	12,744,371	916,266	13,759,972	1,148,727
Other solids....."		645,519		766,361
Total.....		25,137,143		37,287,891
Crude equivalent of stocks on hand Dec. 31st...Gals.	53,307,179		75,102,150	

PHOSPHATE.

The small production of phosphate, or apatite, which has been obtained in Canada since 1896 has been produced almost altogether as a by-product in connexion with the mining of mica. Shipments during 1918 totalled 140 tons, valued at \$1,200.

Phosphate is used at Buckingham, Que., in the manufacture of fertilizers, phosphorus and ferro-phosphorus, and the main supply of ore is obtained from Florida.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production :								
Quebec.....	200	2,400	190	2,340	123	1,230	140	1,200
Ontario.....	17	102	13	174	26	256		
	217	2,502	203	2,514	149	1,486	140	1,200
Exports.....	179	1,860	103	1,543	14	200		
Imports :								
Phosphate rock								
(fertilizer).....		14,148		16,182		62,543		90,363
Acid phosphate (a).....	982	105,035	1,376	146,910	1,440	209,298	1,558	302,424
Phosphorus.....	38	29,572	48	42,738	36	34,519	37	35,125
Phosphor, tin and								
bronze.....		17,217		26,426		50,709		46,554
Manufactured fertilizers		734,952		639,884		1,045,140		670,364
Unmanufactured "				16,301		57,537		82,174

(a) Probably refined phosphate of lime and phosphate of soda.

PYRITES.

The shipments of pyrites as sulphur ore from Canadian mines were about 5,000 tons less in 1918 than 1917. The total shipments during the last year were 411,616 tons, valued at \$1,705,219, and included 124,871 tons, valued at \$507,802, from the Province of Quebec; 268,507 tons, valued at \$1,133,963, from the Province of Ontario; and 18,238 tons, valued at \$63,454, from the Province of British Columbia. The total sulphur content of shipments was 154,269 tons, or an average of 37.5 per cent. Of the total shipments, 83,868 tons were sold for consumption in Canada and 327,748 tons for consumption in the United States.

It had been anticipated during the early part of the year that the production of pyrites during 1918 would considerably exceed that of the previous year, but labour shortage, transportation difficulties, high cost of supplies, and other causes prevented this realization.

The principal shipments were obtained as usual from the same source as in previous years. In Quebec, practically the same tonnage of cupriferous ores was shipped from the Eustis and Weedon mines, in the Eastern Townships. In Ontario the largest shippers for export were the mines at Goudreau, on the Algoma Central railway, in Michipicoten district, and at North Pines, on the Canadian National railway, northwest of Port Arthur. Mines shipping for domestic consumption were the Helen, in Michipicoten, the Sulphide, Queensboro, Craig, Clyde Lake, and Bannockburn, in central Ontario; additional trial shipments of car lots were made from three other properties. In British Columbia shipments were made from the Sullivan mine at Kimberley to the sulphuric acid plant at Trail, and from Anyox to the acid plant at Barnett, B.C.

Customs records show exports of pyrites during 1918 as 240,453 tons, valued at \$949,067. These figures are much less than those reported directly by the operators, and it is possible that some of the exports from Quebec may be entered as a copper ore. The imports of brimstone or sulphur in roll or flour were 92,062 tons, valued at \$2,058,811.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production:								
Quebec	142,735	570,940	130,639	523,272	122,882	501,351	124,871	507,802
Ontario	143,303	414,250	177,552	555,523	288,058	1,080,866	268,507	1,133,963
British Columbia			1,060	5,300	5,709	28,545	18,238	63,454
	286,038	985,190	309,251	1,084,095	416,649	1,610,762	411,616	1,705,219
Sulphur content	116,157		116,975		155,453		154,269	
Exports	137,598	527,318	156,722	557,024	279,646	974,200	240,453	949,067
Imports:								
Brimstone or sulphur in roll or flour	30,182	480,317	73,467	1,186,618	82,445	1,515,309	92,062	2,058,811

Sulphuric Acid.—Sulphuric acid is manufactured in different grades, or strengths, and in recording statistics of production it is desirable for purposes of comparison that the quantities of the several grades should be reduced as far as possible to a uniform standard.

Production records have been obtained in terms of the standard grades 50° Be., 60° Be., 66° Be., and stronger acids. The quantities of the first two grades have, however, in the following statistics been reduced to their equivalent in 66° Be. acid.

The total production of sulphuric acid in Canada during the twelve months ending December 31, 1918, derived from ten producing plants expressed in terms of 66° Be. acid was 190,621 short tons. The production during the first six months of 1918, was 94,383 tons and during the last six months of the year 96,238 tons.

The ores used in the manufacture of sulphuric acid in 1918 included 25,552 tons of imported sulphur, or brimstone, and 75,941 tons of pyrites chiefly from Canadian mines, but including 1,428 tons imported.

Exports of sulphuric acid during 1918 were 11,199,200 pounds valued at \$165,579. Imports of sulphuric acid in 1918 were 5,954 tons valued at \$208,288.

	1915.		1916.		1917.		1918.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Ore used:—		\$		\$		\$		\$
Sulphur.....Tons	4,716		20,566		25,594		25,552	
Pyrites....."	55,586		62,681		66,128		75,941	
Production.....† "	75,838		124,920		153,530		190,621	
Imports....."	141	4,872	2,403	115,173	216	15,680	5,954	208,288
Exports....."	9,635	243,457	1,576	74,527	9,478	197,888	5,600	165,579

* Record includes a small production of Oleum and other grades, the strength of which is not specified. An approximate estimate of production in terms of 50° acid will be obtained by increasing these figures by 50 per cent.

† Tons of 66° Be acid.

QUARTZ (SILICA).

The statistics of quartz, or silica production given in the tabulated statement herewith include chiefly the quartz or quartzite used in the smelting of nickel and copper ores, in the manufacture of ferro-silicon and in the manufacture of sanitary ware, or earthenware. Production of silica in the form of infusorial earth has already been included under tripolite and a small production of silica in the form of crushed sandstone used in the manufacture of glass and for foundry work in steel plants is included in the statistics of sandstone production.

The total shipments of quartz, or quartzite, in 1918, were 268,155 tons valued at \$629,813.

Imports of silex, a finely ground quartz, in 1918 were 607 tons valued at \$12,054 and the imports of flint were 5,749 tons valued at \$109,825.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production:		\$		\$		\$		\$
Quebec.....	778	778	1,149	1,436	550	1,788	1,730	5,383
Ontario.....	95,771	143,257	94,519	167,636	177,983	362,251	216,539	474,772
British Columbia.....	30,559	61,118	41,077	82,154	37,755	132,143	49,886	149,658
	127,108	205,153	136,745	251,226	216,288	496,182	268,155	629,813
Imports:								
Silex.....	402	5,527	1 677	18,297	851	12,812	607	12,054
Flint.....	4,327	48,966	5,349	71,983	3,774	64,292	5,749	109,825

SALT.

In 1918 for the first time since 1907 the quantity of salt sold from Canadian salt wells shows a falling off as compared with the previous year. The total sales in 1918, including the salt equivalent of brine used for chemical manufacturing, were 131,727 tons valued at \$1,285,039. Notwithstanding the decrease of 7,182 tons or 5 per cent in quantity, the total value of the sales shows an increase of \$237,247, or 22.6 per cent. These values as far as possible exclude the value of packages. The value of packages used in 1918 was \$574,033. By grades the production included: table and dairy, 34,324 tons; common fine, 54,210 tons; common coarse, 41,152 tons; and land salt, 2,041 tons.

The number of men employed in 1918 was 302; wages paid \$286,781.

The Canadian production was obtained as usual entirely from the salt field in southern Ontario. Some years ago there was a small production from brines near Sussex, New Brunswick, and at Lake Winnipegosis in Manitoba. A deposit of rock salt of considerable thickness is being opened up in the neighbourhood of Malagash, Cumberland county, Nova Scotia. This is the first known discovery of rock salt in the Maritime Provinces, and the first in Canada to be discovered at a depth sufficiently shallow to allow it to be won economically by actual mining.⁴

The exports of salt in 1918 were 893 tons valued at \$16,743. The imports of salt were 165,494 tons valued at \$1,267,169, and included: 51,450 tons of fine salt in bulk valued at \$294,676; 13,941 tons of salt in packages valued at \$156,736; and 100,103 tons of salt imported from Great Britain, or any British possession for the use of fisheries valued at \$815,757.

The calculated consumption of salt in 1918 was 296,328 tons valued at \$2,535,465 (the value of the imported salt being that at point of origin).

Caustic soda and chloride of lime are manufactured by the Canadian Salt Company at their chemical works at Sandwich, Ont. A second plant is under construction and will shortly be completed⁵ at Amherstburg, Ont., by the Brunner, Mond, Canada, Ltd., in which it is understood the first product to be manufactured will be soda ash.

The imports of salt cake (sodium sulphate) in 1918 were 34,387 tons valued at \$676,571; soda ash (sodium carbonate) 45,569 tons valued at \$1,973,641; caustic soda 6,180 tons valued at \$623,023; sal soda 5,691 tons valued at \$174,555, and of chloride of lime 4,892 tons valued at \$162,748.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production:—		\$		\$		\$		\$
Table and dairy.....			35,045	247,456	34,252		34,324	
Common, fine.....			54,596	262,660	65,117		54,210	
Common, coarse.....			41,259	200,479	37,398		41,152	
Land salt.....			2,003	7,058	2,142		2,041	
Total*.....	119,900	600,226	132,903	717,653	138,909	1,047,792	131,727	1,285,039
Value packages.....		280,747		309,603		403,879		574,033
Stocks on hand, Dec. 31..	3,613		1,970		2,024		2,775	
Exports.....	445	5,836	153	2,223	(a)		893	16,743
Imports:—								
Fine, in bulk ¹	27,613	84,449	34,035	111,130	44,973	184,792	51,450	294,676
In bags, barrels ²	6,867	50,997	7,680	59,980	12,293	120,665	13,941	156,736
All other ³	103,006	382,080	109,493	523,725	113,550	782,748	100,103	815,757
	137,486	517,526	151,208	694,835	130,816	1,088,205	165,494	1,267,169
Consumption.....	256,941	1,111,916	283,958	1,410,265	269,725	2,135,997	296,328	2,535,465

* Quantity sold or used; values exclude packages. (c) Estimated.

¹ Duty 5c. per 100 pounds; ² Duty 7½c. per 100 pounds; ³ Free—Imported for use of fisheries.

(a) Correct figures not available.

⁴ Notes on a Discovery of Rock Salt in Nova Scotia, by L. H. Cole, Mines Branch, Ottawa. Can. Min. Journal, January 8, 1919.

⁵ This plant was placed in operation early in October, 1919.

TALC.

The total shipments of crude and ground talc by mine operators during 1918 were 18,169 tons valued at \$119,197. A considerable portion of the shipments of crude mineral included above is ground at Madoc and the total shipments of ground talc during 1918 were 15,903 tons of varying grades having an average of about \$14 per ton as compared with 13,703 tons averaging \$12.50 in 1917. Crude talc sold at from \$3.50 to \$5 per ton.

The Henderson mine has been operated for some years, the greater part of the output being sold to Geo. H. Gillespie & Co., who operate a grinding mill at Madoc, the balance being exported to United States. The Connolly mine, of the Anglo-American Talc Corporation, was also operating. Small shipments of ground talc were reported from British Columbia in 1916 and 1917.

Exports of talc for the 12 months ending December 31, 1918, were valued at \$208,301, the quantity not being recorded.

Imports of talc in 1915 were 154 tons valued at \$1,866 and have not been separately recorded since.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production (a):—								
Crude.....	11,885	40,554	13,051	48,575	13,184	51,856	12,772	47,494
Refined.....			53	848	2,619	24,683	5,397	71,703
	11,885	40,554	13,104	49,423	15,803	76,539	18,169	119,197
Imports*	154	1,866						
Exports**						131,637		208,301
Total refined sold (b)...	6,748	77,602	8,198	98,588	13,703	171,788	15,903	222,167

*Not separately recorded since 1915. **Not recorded prior to April, 1917.

(a) Mine operators' returns. (b) Product Canadian plants.

STRUCTURAL MATERIALS AND CLAY PRODUCTS.

INTRODUCTORY.

The subjects included under this heading comprise cement, clay products of various kinds, such as brick, sewerpipe and tile, pottery, etc., lime, sand-lime brick, sand and gravel, slate, and stone for building and other purposes: including granite, marble, limestone, sandstone, etc.

The total value of the production of these structural products in 1918 was \$19,130,799 as compared with \$19,837,311 in 1917, \$17,467,186 in 1916, and \$17,920,759 in 1915, the decrease in 1918 being \$706,512, or 3.6 per cent, as compared with the previous year.

The total value of imports for the same class of products in 1918 was \$8,117,394, as against \$7,901,398 in 1917, \$5,562,220 in 1916, and \$3,912,946 in 1915.

The total exports were valued at \$608,886 as against \$647,369 in 1917, \$681,239 in 1916, and \$519,676 in 1915.

The apparent total consumption of these structural products based upon the record of production, imports and exports, was in 1918 valued at \$26,639,307 as compared with \$27,091,340 in 1917, \$22,348,167 in 1916, and \$21,314,029 in 1915, the decrease in value of consumption in 1918 being \$452,033.

A summary of the production, imports, exports and consumption of structural materials and clay products in 1918 follows:—

Structural Materials, Calendar Year 1918.

	Production.	Imports.	Exports.	Consumption.
	\$	\$	\$	\$
Cement, portland	7,076,503	23,360	13,752	7,091,111
Clay products	4,583,489	6,734,081	174,917	11,142,653
Lime	1,876,025	53,745	70,930	1,858,840
Sand-lime brick	186,066			186,066
Sand and gravel	2,367,018	435,992	229,957	2,573,053
Slate	5,124	133,054		138,178
Stone	3,036,574	732,162	119,330	3,649,406
	19,130,799	8,117,394	608,886	26,639,307

CEMENT.

The total quantity of cement sold from Canadian cement mills in 1918 was 3,591,481 barrels valued at \$7,076,503, or an average of \$1.97 per barrel, a decrease in quantity sold of 1,177,007 barrels, or 24.68 per cent, and a decrease in total value of \$647,743, or 8.38 per cent.

Sales of cement from mills in Quebec in 1918 were 1,564,360 barrels valued at \$3,003,571; in Ontario, 1,220,003 barrels valued at \$1,976,815; and from Manitoba, Alberta, and British Columbia, 807,118 barrels valued at \$2,096,117.

The total quantity of cement made in 1918 was 3,417,660 barrels as compared with 4,987,255 barrels made in 1917, a decrease of 1,569,595 barrels, or 31.47 per cent.

Stocks of cement on hand January 1, 1918, were 1,660,406 barrels and at the end of December had been reduced to 1,480,565 barrels.

The total imports of cement in 1918 were 20,695 hundredweight equivalent to 5,913 barrels of 350 pounds each, valued at \$19,851, or an average of \$3.36 per barrel.

The total consumption of cement, therefore, neglecting a small export, was 3,597,394 barrels, a decrease of 1,179,674 barrels, or 24.57 per cent.

	1915.		1916.		1917.		1918.	
	Bbbs.	Value.	Bbbs.	Value.	Bbbs.	Value.	Bbbs.	Value.
Plants:		\$		\$		\$		\$
Active: No. Capacity.....	16-38,850		15-38,475		9-28,340		10-29,275	
Idle: No. Capacity.....	10-13,100		14-14,940		17-21,890		13-18,940	
Output:								
Marl.....	429,268		164,436		96,755		86,532	
Limestone.....	4,724,495		4,588,597		4,890,500		3,331,128	
	5,153,763		4,753,033		4,987,255		3,417,660	
Sold or used.	5,681,032	6,977,024	5,369,560	6,547,728	4,768,488	7,724,246	3,591,481	7,076,503
Stocks Dec. 31. .	2,062,961		1,444,875		1,660,406		1,480,565	
Imports:								
Portland.....	28,190	40,426	20,596	31,621	8,580	19,646	5,913	19,851
Manufactures		7,410		12,126		8,710		8,509
Exports.....		5,161		2,424		16,857		13,752
Consumption.....	5,709,222		5,390,156		4,777,068		3,597,394	

CLAYS AND CLAY PRODUCTS.

For a number of years a small quantity of fireclay has been produced and sold as such, and during the past few years there has been a small, but increasing production of kaolin, or china-clay from a deposit in the Province of Quebec. With these exceptions, the clay production in Canada consists almost altogether of the manufactured product.

The clay products made in Canada comprise brick of various kinds, including common and pressed, ornamental and fancy building brick, paving brick, firebrick, porous fire-proofing brick and blocks, sewerpipe and drain tile, pottery and sanitary ware, the last two products chiefly from imported clays.

The total value of the clay products sold or marketed in 1918 was \$4,583,489, as compared with a value of \$4,779,038 in 1917; \$4,120,805 in 1916, and \$3,914,488 in 1915. The value of the production in 1918 shows a decrease of \$195,549 as compared with the previous year.

The average number of men employed in 1918 was 3,423 as compared with 3,915 in the previous year, and the total wages paid were \$2,131,614, as against \$2,174,167.

Of the total value of the sales in 1918, building brick and fireproofing contributed \$2,830,010 or about 61.7 per cent. Sewerpipe and tile production, \$1,199,114 or 26.1 per cent. The total value of the production of pottery was \$647,622 of which \$130,242 only, is estimated as attributable to Canadian clays, the balance being credited to imported clays.

The value of the production of fireclays and firebrick from domestic clay, was \$404,824, and the production of kaolin was 863 tons valued at \$19,299.

Detailed statistics of production of the several classes of clay products by provinces in 1918, are shown in the following table:—

Production of Clay Products by Provinces, 1918.

Province.	Per cent of total value.	No. of active firms reporting.	No. of men employed.	Wages.	Common brick.			Pressed brick.				
					No. manu- factured.	No. sold.	Value of sales.	Per M	No. manu- factured.	No. sold.	Value of sales.	Per M
Nova Scotia.....	6.62	10	265	\$ 147,414	14,199,500	12,748,500	\$ 120,865	\$ 9.48	.....	.....	.....	\$ .....
New Brunswick ..	0.85	5	72	26,558	1,680,000	1,550,000	20,255	13.07	.....	.....	.....	.....
Quebec	17.83	16	664	348,191	41,345,025	45,734,729	479,974	10.49	3,545,290	3,266,132	64,033	19.61
Ontario	53.11	163	1,731	1,142,856	73,744,881	75,067,667	915,704	12.20	28,262,037	30,495,086	476,783	15.63
Manitoba.....	2.54	6	120	38,228	7,046,000	7,458,348	103,928	13.93	.....	.....	.....	.....
Saskatchewan.....	2.92	9	123	54,490	5,653,000	5,290,468	62,219	11.76	1,326,000	1,035,500	25,209	24.33
Alberta.....	8.32	10	297	210,505	16,225,000	12,680,565	122,447	9.66	4,348,000	4,499,520	59,614	13.25
British Columbia.	7.81	11	151	163,842	4,066,250	4,439,810	54,419	12.26	690,298	850,298	13,444	15.82
Total.....	100.00	230	3,423	2,131,614	163,959,656	164,970,087	1,879,811	11.39	38,171,625	40,146,536	639,083	15.92

Province.	Fireproofing.		Ornamental and terra-cotta.		Refractories		Hollow building blocks.		Pottery.		Sewerpipe.		Tiles, drain.		Kaolin.		Total.
	Tons.	Value.	No. sold.	Value.	Value.	No. sold	Value.	No. sold	Value.	Tons.	Value.	M.	Value.	Value.	Value.	Value.	
Nova Scotia.....	.....	\$ ..	.....	\$ ..	\$ 71,977	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	303,515
New Brunswick...	.....	.....	.....	.....	.....	.....	.....	.....	18,800	.....	.....	286	4,605	.....	.....	.....	39,055
Quebec.....	3,242	23,857	31,108	1,221	59,333	.....	.....	.....	627	10,138	162,216	100	6,797	19,299	.....	.....	817,357
Ontario.....	15,683	138,221	501,437	42,221	.....	160,708	5,507	.....	38,165	18,126	362,531	18,917	455,083	.....	.....	.....	2,434,215
Manitoba.....	.....	.....	.....	.....	.....	861,450	12,489	.....	.....	.....	.....	.....	.....	.....	.....	.....	116,417
Saskatchewan.....	.....	.....	.....	.....	19,007	.....	.....	.....	.....	.....	.....	275	27,500	.....	.....	.....	133,385
Alberta.....	9,162	64,720	.....	.....	2,193	117,000	995	.....	72,650	293	56,267	59	2,188	.....	.....	.....	381,074
British Columbia.	.....	.....	.....	.....	252,314	243,000	21,885	.....	909	.....	12,692	125	3,167	.....	.....	.....	357,921
Total.....	28,087	226,798	(c) 532,545	43,442	(b) 404,824	(a) 1,402,158	40,876	(a) 130,242	36,574	699,774	19,762	499,340	.....	.....	.....	.....	4,583,489

(a) There was also a production of \$517,380 from imported clays. (b) There was also a production of \$92,558 from imported clays. (c) Of which 174,752 valued at \$15,146 credited to terra-cotta.

Clay Paving Brick.—Paving brick has been made in Canada, chiefly at West Toronto, Ontario, from shale obtained from the banks of the Humber river, and more recently during the years 1915 and 1916 there was a small production reported from Clayburn, B.C. There was no production reported for the year 1917 and 1918. The annual production for a number of years has varied from 3,000,000 to over 5,000,000 per season.

Drain Tile.—The total sales of drain tile in Canada as reported to this Branch, were 19,762 M valued at \$499,340. The greater part of this production is from Ontario, the sales in this Province as reported by the producers being 18,917 M valued at \$455,083.

Kaolin.—The shipments of kaolin in 1918 were 863 tons, valued at \$19,299, as compared with 533 tons, valued at \$9,594 in 1917.

The production was obtained from the deposits in the township of Amherst, Ottawa county, Quebec, operated by the Canadian China Clay Company, of Toronto.

The plant for refining the clay is situated 2 miles from St. Remi d'Amherst, and 7 miles from Huberdeau, the terminus of the Montfort branch of the Canadian National Railway, 46 miles northwest of Montreal.

Pottery.—Sanitary porcelain is made at St. Johns, Que., and electrical porcelain is made at Hamilton and Peterboro, Ont. These are the only firms in Canada at present making white wares. The raw materials, including clays, ground quartz and feldspar are all imported.

Stoneware pottery, such as crocks, jars, churns, and jardinières, is made at Medicine Hat, Alberta, from Saskatchewan clay; at Hamilton, Ont., from imported clays; and at St. John, N.B., partly from Nova Scotia clay.

Flower pots are made at a few localities from the red burning and tile clays of the vicinity.

Refractories.—The total value of the sales of fireclay, firebrick, and fireclay brick in 1918 was \$404,824. There was in addition in 1918, a production of fireclay products valued at \$92,558 reported as being made from imported clays. The production in 1918 included: fireclay, or refractory clay sold as such 8,732 tons, valued at \$44,351; firebrick 7,192 M valued at \$248,884, and other fireclay products valued at \$111,589.

Sewerpipe.—The total sales of sewerpipe in 1918 were 36,574 tons, valued at \$699,774. About 50 per cent of the value of the production is credited to Ontario.

		1915.		1916.		1917.		1918.	
		Quant'y	Value.	Quant'y	Value.	Quant'y	Value.	Quant'y	Value.
			\$		\$		\$		\$
Manufactured—									
Common brick...	M	196,819	.....	241,521	.....	216,596	.....	163,360	.....
Pressed brick...	M	41,452	.....	43,361	.....	51,472	.....	38,171	.....
Stocks, Dec. 31—									
Common.....	M	127,511	.....	85,879	.....	57,596	.....	57,419	.....
Pressed.....	M	20,306	.....	15,778	.....	17,273	.....	11,665	.....
Production—									
Common.....	M	234,733	1,755,187	237,035	1,826,844	210,631	1,999,465	164,970	1,879,811
Pressed.....	M	49,817	492,774	44,947	492,355	46,409	653,153	40,147	639,083
Fire proofing....	Tons.	}	253,401	}	361,555		299,645	28,087	226,798
Hollow building blocks.....	M						95,088	1,402	40,876
Kaolin.....	Tons.	1,300	13,000	1,750	17,500	533	9,594	863	19,299
Ornamental.....	M	}	49,097	}	21,102		32,854	358	28,296
Terra-cotta.....	M						21,380	175	15,146
Paving.....	M	1,228	20,694	1,590	30,144				
Pottery.....			64,900		61,069		122,878		130,242
Refractories:—									
Fireclay.....	Tons.	2,328	12,065	9,206	30,767	10,534	49,455	8,732	44,351
Firebrick.....	M	2,896	68,700	5,689	147,757	8,192	199,171	7,192	248,884
Other products.....			29,928		56,038		77,885		111,589
Sewerpipe.....	Tons.		799,446		716,287		783,762	36,574	699,774
Tile, drain.....	M		355,296		359,387		434,708	19,762	499,340
			3,914,488		4,120,805		4,779,038		4,583,489
Imports—									
Bath brick.....			£30		902		2,299		2,134
Building brick..	M	10,168	114,958	10,083	118,687	4,111	61,511	3,232	55,976
Bldg. blocks.....			181,145		69,353		151,765		64,622
Clays—									
China.....	Tons.	21,940	124,658	19,062	114,110	11,596	97,856	10,538	116,999
Fire.....			87,267		187,124		283,746		401,357
Pipe.....			614		2,440		2,427		2,167
Other clays.....			24,557		21,820		32,180		34,130
Drain tile, unglazed.....			346		2,072		2,289		481
Drain and sewerpipe.....			41,801		40,233		42,864		24,763
Earthen and chinaware.....			1,460,010		2,180,414		2,595,582		2,163,455
a Firebrick.....			577,458		1,162,679		1,994,212		2,852,233
Firebrick, n.o.p.....			235,613		495,113		691,578		650,341
b Magnesite brick.....							470,801		210,103
Paving brick....	M	5,865	76,759	5,667	70,268	2,190	37,814	798	17,534
Other clay mfrs.....			72,649		88,952		143,913		138,086
			2,998,465		4,554,167		6,610,837		6,734,081
Exports—									
Bldg. brick.....	M	1,155	9,089	1,746	13,942	4,464	40,039	3,277	34,593
Manufactures.....			25,202		58,550		83,600		129,691
Earthenware.....			11,281		7,620		14,504		10,633
			45,572		80,112		138,143		174,917
Consumption.....			6,867,381		8,594,860		11,251,732		11,142,653

(a) Duty free; of a kind not made in Canada.

(b) Not separately shown prior to April, 1917.

LIME.

The production of lime in 1918 is reported as 6,363,951 bushels, valued at \$1,876,025, or an average of 29.5 cents per bushel. Sixty-five firms reported with 741 men employed, and wages, \$664,357.

The average price per bushel of lime sold in 1918 varied from a minimum of 20 cents in Nova Scotia to a maximum of 55 cents in Alberta. About 83 per cent of the total production was derived from Ontario, Quebec, and the Maritime Provinces. The production of hydrated lime was 18,133 tons, valued at \$167,250.

The exports during 1918 were 7,483 tons, valued at \$70,930, while the imports were 4,987 tons, valued at \$53,745.

	1915.		1916.		1917.		1918.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Production:	Bush.	\$	Bush.	\$	Bush.	\$	Bush.	\$
Nova Scotia....	915,086	183,017	909,800	181,960	985,286	197,057	748,314	149,663
P. E. Island....			1,734	546	820	287		
New Brunswick.	369,117	93,797	424,113	104,635	532,251	171,248	482,548	221,935
Quebec.....	1,351,306	274,831	1,498,845	267,119	1,470,486	335,012	1,527,784	418,883
Ontario.....	1,903,914	328,515	2,031,396	367,115	2,846,850	663,368	2,660,791	762,976
Manitoba.....	281,432	71,372	355,301	83,754	393,982	92,932	462,544	134,725
Alberta.....	74,152	14,445	78,019	20,033	104,540	35,516	80,408	44,141
Br. Columbia..	152,237	49,725	194,042	66,301	232,955	58,067	401,562	143,697
	5,047,244	1,015,702	5,493,250	1,091,463	6,567,170	1,558,487	6,363,951	1,876,025
Hydrated Lime produced.....	Tons.		Tons.		Tons.		Tons.	
	7,972		9,137	56,775	16,339	126,268	18,133	167,250
Imports.....	18,977	98,040	21,178	96,332	12,150	78,254	4,987	53,745
Exports.....		15,617		66,406		74,523	7,483	70,930

SAND-LIME BRICK.

The first record of the production of sand-lime brick in Canada was obtained for the year 1907, when there was a production by ten firms amounting to 16,492,971 brick, valued at \$167,795.

In 1918 the sales were reported at 14,589,324 brick, valued at \$186,066, or an average of \$12.75 per thousand, as compared with sales in 1917 of 18,001,990 brick, valued at \$201,355.

	1915.		1916.		1917.		1918.	
	M.	Value.	M.	Value.	M.	Value.	M.	Value.
Manufactured.....	7,678	\$	13,884	\$	17,080	\$	15,256	\$
Sold or used.....	17,961	141,742	16,541	126,235	18,002	201,355	14,589	186,066
Stocks, Dec. 31.....	9,347		5,178		3,259		2,610	

SAND AND GRAVEL.

The total sales of sand and gravel produced in Canada during 1918 amounted to 11,262,282 tons, valued at \$2,367,018. This production included: building sand and gravel for concrete and road building, 1,019,770 tons valued at \$412,357; gravel, including sand and gravel and crushed gravel, 1,477,851 tons, valued at \$750,010; railway ballast, 8,633,917 tons, valued at \$1,087,207; moulding sand, 62,835 tons, valued at \$71,488; and other sands, core sands, engine sands, etc., 67,909 tons, valued at \$45,956.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production—		\$		\$		\$		\$
Sand	1,169,756	440,619	1,379,319	475,811	1,505,907	614,272	1,019,770	412,357
Sand and gravel	1,338,409	591,135	2,058,900	767,530	2,214,369	904,584	1,477,851	750,010
Ballast.....	3,773,297	527,257	4,559,686	521,189	5,312,218	718,801	8,633,917	1,087,207
Moulding sand. }	164,255	65,756	19,251	16,726	46,790	46,018	62,835	71,488
All other.			139,051	57,064	103,133	42,574	67,909	45,956
	6,445,717	1,624,767	8,156,207	1,838,320	9,182,417	2,326,249	11,262,282	2,367,018
Imports.....	199,597	120,756	233,777	183,894	328,520	312,403	310,610	435,99
Exports.....	808,022	380,549	1,114,913	388,309	1,075,374	290,964	902,750	229,95

SLATE.

There is a small annual production of slate in Canada, obtained from the New Rockland quarries, Melbourne township, Richmond county, Quebec, operated by the New Rockland Slate Co., Ltd.

The production in 1918 was 933 squares, valued at \$5,124, as compared with the production in 1917 of 1,422 squares, valued at \$7,789.

Exports have not been reported since 1909. The imports of slate during the past twelve years have ranged in value from \$90,000 to over \$200,000 per annum. During the calendar year 1918 they were valued at \$133,054.

	1915.		1916.		1917.		1918.	
	Squares.	Value.	Squares.	Value.	Squares.	Value.	Squares.	Value.
Production	397	\$ 2,039	1,262	\$ 6,223	1,422	\$ 7,789	933	\$ 5,124
Imports:								
Roofing	7,483	34,528	4,412	21,335	3,909	20,785	8,296	47,975
School-writing.....		38,874		35,887		40,603		41,122
Pencils		4,954		11,309		8,717		10,361
All other.....		30,320		28,245		36,788		33,596
		108,676		96,776		106,893		133,054

STONE.

Statistics of stone production given herewith include the sales of all classes of stone used for building, monumental and ornamental purposes, stone for paving purposes, curbstone and flagstone, rubble, riprap and crushed stone, limestone for furnace flux, sugar factories, etc., but stone used for burning lime or manufacturing cement is not included.

The kinds of stone quarried have been classed as granite (including trap rock, syenite, and other igneous rocks), limestone, sandstone, and marble.

The records are practically confined to quarry operations, and to the production of sawn or polished stone when these operations are carried on by quarry operators. In addition to this production of stone by regular operators, there is no doubt a large stone production by individuals, such as farmers and others, for house or barn foundations, concrete work, etc., of which it would be impracticable to obtain any satisfactory record. Much stone is also used in railway construction work and in road building, of which the record is probably very incomplete.

The total value of the production of stone during 1918, according to returns received, was \$3,036,574, as compared with a value of \$3,240,147 in 1917, showing a falling off of \$203,573.

The number of active firms reporting in 1918 was 141, the total number of men employed 2,368, and total wages paid \$1,646,987.

Production of Stone by Kinds and by Provinces, Showing Purposes Used, 1918.

By kinds.	Building.	Ornamental and monumental	Paving and curbstone.	Rubble.		Crushed.		Furnace Flux.		Total Value.	Per cent of Total.
				Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.		
Granite...	\$ 120,978	\$ 250,373	\$ 44,535	6,346	\$ 5,682	198,128	\$ 169,303	...	\$	\$ 590,871	19.5
Limestone...	386,387	4,702	212	77,468	61,671	1,132,506	1,021,384	801,474	868,047	2,342,403	77.1
Marble...	450	...	...	...	...	100	100	...	...	550	...
Sandstone...	18,237	...	...	4,808	6,879	34,593	77,634	...	...	102,756	3.4
By Provinces.											
Nova Scotia...	44,481	10,232	4,180	1,384	1,712	21,917	47,607	337,688	370,509	478,721	15.8
New Brunswick...	1,348	(1) 70,676	3,180	400	200	8,534	23,640	...	...	99,044	3.3
Quebec...	214,060	156,849	28,290	21,312	19,999	462,461	532,504	600	700	952,402	31.4
Ontario...	44,430	15,318	9,097	51,867	38,218	819,567	615,327	348,642	337,355	1,073,745	35.5
Manitoba...	217,541	...	...	6,202	6,686	9,637	8,684	10,680	5,340	238,251	7.8
Alberta...	...	...	...	...	...	643	569	...	...	569	...
British Columbia...	4,192	2,000	...	7,427	7,417	42,568	40,090	103,864	134,143	187,842	6.2
Total...	526,052	255,075	44,747	88,622	74,232	1,365,327	1,263,421	801,474	868,047	3,036,574	...
Per cent...	17.3	8.4	1.5	...	2.4	...	41.8	...	28.6	...	...

(1) Finished stone valued at \$134,417.

	1915.		1916.		1917.		1918.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production :		\$		\$		\$		\$
Granite.....		1,525,553		1,247,267		639,412		590,871
Limestone.....		2,312,081		2,224,091		2,283,659		2,342,403
Marble.....		153,027		118,810		55,820		550
Sandstone.....		249,336		146,244		261,256		102,750
Production :								
Nova Scotia.....		367,924		459,298		569,521		478,721
New Brunswick.....		153,512		112,257		111,150		99,044
Quebec.....		1,966,194		1,370,465		991,593		952,402
Ontario.....		806,137		857,023		992,455		1,079,745
Manitoba.....		153,464		372,894		301,968		238,251
Alberta.....		890		257		7,482		569
British Columbia.....		796,876		564,218		265,978		187,842
		4,244,997		3,736,412		3,240,147		3,036,574
Exports :								
Crushed.....	42,716	24,453	26,754	27,611	2,308	2,277	1,526	1,983
Ornamental, rough (a).....	29,976	12,764	15,967	7,989	330	359	1,042	5,059
Building, rough (b).....	35,804	28,910	128,453	103,796	139,153	122,430	62,683	107,690
Dressed.....		6,650		4,592		1,816		4,598
		72,777		143,988		126,882		119,330
Imports :								
Building stone.....		112,010		112,349		176,134		125,132
Granite.....		180,188		133,229		132,645		85,652
Marble.....		152,454		171,849		199,697		284,862
Refuse stone.....		94,521		169,877		256,182		236,516
		539,173		587,304		764,658		732,162

(a) Granite, marble, etc., unwrought. (b) Freestone, limestone, etc., unwrought.

Rev. Doe
can
-D-28

CANADA
DEPARTMENT OF MINES

HON. SIR JAMES A. LOUGHEED, MINISTER; CHARLES CAMSELL, ACTING DEPUTY MINISTER.

MINES BRANCH
EUGENE HAANEL, PH.D., DIRECTOR.

ANNUAL REPORT



ON THE

MINERAL PRODUCTION OF CANADA

During the Calendar Year

1919



OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

No. 545

CANADA
DEPARTMENT OF MINES

HON. SIR JAMES A. LOUGHEED, MINISTER; CHARLES CAMSELL, ACTING DEPUTY MINISTER.

MINES BRANCH
EUGENE HAANEL, PH.D., DIRECTOR.

ANNUAL REPORT
ON THE
MINERAL PRODUCTION OF CANADA
During the Calendar Year
1919



OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

LETTER OF TRANSMITTAL.

DR. EUGENE HAANEL,
Director of Mines Branch,
Department of Mines,
Ottawa.

SIR,—I beg to hand you, herewith, in abbreviated form the Annual Report on the Mineral Production of Canada, giving revised statistical information descriptive of the mining and metallurgical production in Canada during the calendar year 1919.

A preliminary report on the mineral production during 1919 was sent to press February 28, 1920, and issued within the following week.

The present report, as did the corresponding issue for 1918, presents a general summary only of the mineral production and will be supplemented by separate and detailed reports on "The Production of Coal and Coke in Canada, 1919"; "The Production of Iron and Steel in Canada, 1919"; and "The Production of Copper, Gold, Lead, Nickel, Silver, Zinc and other Metals in Canada during 1919."

That section of this report dealing with metals and metalliferous ores, except iron and steel, has been prepared by Mr. A. Buisson; and the entire section dealing with non-metalliferous products, including structural materials, has been prepared by Mr. John Casey.

The co-operation of Canadian mine and smelter operators who have, almost without exception, cheerfully furnished the department with statistics and information regarding their operations is gratefully acknowledged. Thanks are due also to railway and other transportation companies and to smelter operators outside of Canada for data furnished.

(Signed) JOHN McLEISH.

DIVISION OF MINERAL RESOURCES AND STATISTICS,

November 12, 1920.

CONTENTS

	PAGE
LETTER OF TRANSMITTAL.. . . .	3
EXPLANATORY NOTES—	
Definition of the terms 'ton' and 'year' used.. . . .	7
Basis of valuation and compilation.. . . .	7
MINERAL PRODUCTION OF CANADA—	
GENERAL SUMMARY—	
Mineral production in Canada, 1918 and 1919, comparative table.. . . .	11
General table of exports and imports.. . . .	15
Production by provinces, 1918 and 1919.. . . .	22
Mine production.. . . .	28
METALLIC PRODUCTS.	
ALUMINIUM.. . . .	36
ANTIMONY.. . . .	36
COBALT.. . . .	37
COPPER.. . . .	37
GOLD.. . . .	39
IRON AND STEEL—	
Iron ore.. . . .	39
Pig-iron.. . . .	40
Steel.. . . .	41
LEAD.. . . .	42
MERCURY.. . . .	43
MOLYBDENUM.. . . .	43
NICKEL.. . . .	44
PLATINUM.. . . .	45
SILVER.. . . .	46
TIN.. . . .	46
TUNGSTEN.. . . .	47
ZINC.. . . .	47
NON-METALLIC PRODUCTS.	
ABRASIVE MATERIALS—	
Corundum.. . . .	48
Grindstones.. . . .	48
Tripolite.. . . .	49
ACTINOLITE.. . . .	50
ARSENIC.. . . .	50
ASESTOS.. . . .	51
BARYTES.. . . .	52
CHROMITE.. . . .	52
COAL.. . . .	53
COKE.. . . .	54
FELDSPAR.. . . .	57
FLUORSPAR.. . . .	57
GRAPHITE.. . . .	58
GYPSUM.. . . .	59
MAGNESITE.. . . .	59
Metallic magnesium.. . . .	60
Magnesium sulphate.. . . .	60
MANGANESE.. . . .	61

	PAGE
MICA..	62
MINERAL PIGMENTS, IRON OXIDES..	62
MINERAL WATER..	63
NATURAL GAS..	63
PEAT..	64
PETROLEUM..	65
PHOSPHATE..	69
PYRITES..	70
Sulphuric acid..	70
QUARTZ..	71
SALT..	72
TALC..	73

STRUCTURAL MATERIALS AND CLAY PRODUCTS.

CEMENT..	74
CLAY PRODUCTS..	75
LIME..	78
SAND-LIME BRICK..	79
SAND AND GRAVEL..	79
SLATE..	80
STONE..	80

EXPLANATORY NOTES.

The term "ton" used throughout this report signifies a ton of 2,000 pounds; while the year referred to means calendar year, unless otherwise stated. The Government fiscal year formerly ended on the 30th June; but now terminates on the 31st March. This change took place in 1907, hence the fiscal period ending March 31, 1907, covers only nine months.

Statistics of exports and imports given throughout this report are compiled from the reports of the Trade of Canada, collected by the Customs Department and published by the Department of Trade and Commerce.

The term "production" used throughout this report may in general be interpreted as meaning the quantity sold or shipped. Mineral products mined or manufactured, but not sold or shipped at the end of the year, are not included as "production." An exception to this usage will be found in reference to pig-iron, in which case the statistics of production represent the quantities made.

The value of the metallic minerals produced, whether refined in Canada or not, is calculated on the basis of the average price of the metal in some recognized market. New York prices have usually been taken as the standard, except in the case of lead, for which the Montreal price is now used. The value of non-metallic products is given as at the mine or point of shipment.

THE MINERAL PRODUCTION OF CANADA

During the Calendar Year 1919

A preliminary report on the mineral production of Canada in 1919 was published on February 28, 1920, the statistical record being at that time partially estimated and therefore subject to revision.

According to the revised statement now presented the total value¹ in 1919 was \$176,686,390, about three and a half million dollars in excess of the total value estimated in the preliminary report.

Compared with the total value of the production in 1918, which was \$211,301,897, that of 1919 shows a decrease of 16.38 per cent.

The detailed comparative statement here presented shows the production of each important product during the past two years, the proportion which each contributes to the total production, and the increase or decrease as the case may be of the production in 1919 as compared with that of 1918.

The total value of the metallic production in 1919 was \$73,262,793, as against a value of \$114,549,152 in 1918 and \$106,455,147 in 1917, showing a decrease of \$41,286,359 or over 36 per cent in 1919 as compared with the previous year.

The total value of the production of non-metallic products in 1919 was \$103,423,597, as against \$96,752,745 in 1918 and \$83,191,674 in 1917. The value of non-metallic products in 1919 was greater than that of any previous year. Much of this increase is to be credited to higher prices realized for most of these products though on the other hand important increases have been made in the quantities of products produced including asbestos and the various classes of structural material.

The total value of the production in 1886 was \$10,221,255, or about \$2.23 per capita. In ten years the value had increased to \$22,474,256, or \$4.38 per capita, more than twice the total in 1886, and nearly twice the production per capita. The next ten years witnessed an increase to \$79,286,697 in 1906, or \$12.81 per capita, about three and a half times the production in 1896. The total in 1919 was more than double that of 1906.

The record of annual mineral production in Canada since 1886 and the total annual production of metallic and non-metallic products since 1907 are shown in the following tables:—

¹ In presenting a total valuation of the mineral production as is here given, it should be explained that the production of the metals, copper, gold, lead, silver, and zinc, is given as far as possible on the basis of the quantities of metals recovered in smelters, and the total quantities in each case are valued at the average market price of the refined metal in a recognized market. There is thus included, in some cases, the values that have accrued in the smelting or refining of metals outside of Canada.

Annual Mineral Production in Canada since 1886.

Year.	Value of production.	Value per capita.	Year.	Value of production.	Value per capita.
	\$	\$		\$	\$
1886.....	10,221,255	2·23	1903.....	61,740,513	10·83
1887.....	10,321,331	2·23	1904.....	60,082,771	10·27
1888.....	12,518,894	2·67	1905.....	69,078,999	11·49
1889.....	14,013,113	2·96	1906.....	79,286,697	12·81
1890.....	16,763,353	3·50	1907.....	86,865,202	13·75
1891.....	18,976,616	3·92	1908.....	85,557,101	13·16
1892.....	16,623,415	3·39	1909.....	91,831,441	13·70
1893.....	20,035,082	4·04	1910.....	106,823,623	14·93
1894.....	19,931,158	3·98	1911.....	103,220,994	14·42
1895.....	20,505,917	4·05	1912.....	135,048,296	18·27
1896.....	22,474,256	4·38	1913.....	145,634,812	18·77
1897.....	28,485,023	5·49	1914.....	128,863,075	15·96
1898.....	38,412,431	7·32	1915.....	137,109,171	17·29
1899.....	49,234,005	9·27	1916.....	177,201,534	21·77
1900.....	64,420,877	12·04	1917.....	189,646,821	22·68
1901.....	65,797,911	12·16	1918.....	211,301,897	24·59
1902.....	63,231,836	11·36	1919.....	176,686,390	.....

Annual Values of Metallic and Non-Metallic Production.

Year.	Metallic.	Non-Metallic.		Total.
		Fuels and other non- metallics.	Structural or clay and stone quarry products.	
	\$	\$	\$	\$
1907.....	42,426,607	31,275,546	12,863,049	(a) 86,865,202
1908.....	41,774,362	32,142,784	11,339,955	(a) 85,557,101
1909.....	44,156,841	31,141,251	16,533,349	91,831,441
1910.....	49,438,873	37,757,158	19,627,592	106,823,623
1911.....	46,105,423	34,405,960	22,709,611	103,220,994
1912.....	61,172,753	45,080,674	28,794,869	135,048,296
1913.....	66,361,351	48,463,709	30,809,752	145,634,812
1914.....	59,386,619	43,467,229	26,009,227	128,863,075
1915.....	75,814,841	43,373,571	17,920,759	137,109,171
1916.....	106,319,365	53,414,983	17,467,186	177,201,534
1917.....	106,455,147	63,354,363	19,837,311	189,646,821
1918.....	114,549,152	77,621,946	19,130,799	211,301,897
1919.....	73,262,793	76,002,087	27,421,510	176,686,390

(a) Total includes \$300,000 allowed for products not reported.

The production of pig-iron given in the general table includes only that proportion of the output of Canadian blast furnaces credited to Canadian ores. There is an important production of pig-iron from imported ores (shown in the footnotes to the general table and in the chapter on iron and steel) and the total value thereof in 1918 was exceeded only by the production of coal and nickel. There is also a large production of aluminium from imported ores for which no value is included, in the general table of production.

Comparative Statement of Mineral Production for Years 1918 and 1919.

Product.	1918.			1919.			Increase (+) or Decrease (-).				
	Quantity.	Value (a).	Per cent of total.	Quantity.	Value (a).	Per cent of total.	Quantity.	%	Value.	Increase (+) or Decrease (-).	
<i>Metallic.</i>											
Cobalt metallic and contained in oxide..		\$			\$				\$		
Copper (b)..... Lb.	1,347,544	3,368,860	1.59	530,371	1,325,928	0.75	817,173	60.64	2,042,932	60.64	
Gold..... Fine oz.	118,769,434	29,250,536	13.84	75,053,581	14,028,265	7.94	43,715,853	36.81	15,222,271	52.04	
Iron, pig, from Canadian ore (c)..... Tons.	699,681	14,463,689	6.85	766,764	15,850,423	8.97	8,987	9.59	1,386,734	9.59	
Iron ore sold for export (k).....	47,444	1,204,703	0.57	38,457	899,406	0.51	8,987	18.94	305,297	25.34	
Lead (d)..... Lb.	118,472	498,999	0.24	5,883	46,525	0.03	112,589	95.00	432,474	90.68	
Molybdenite.....	51,398,002	4,754,315	2.25	43,827,699	3,053,037	1.73	7,570,303	14.73	1,701,278	35.78	
Nickel (e).....	378,029	434,733	0.21	83,002	69,203	0.04	295,027	78.04	365,530	84.08	
Palladium..... Crude oz.	92,507,293	37,002,917	17.51	44,544,882	17,817,953	10.08	47,962,410	51.85	19,184,964	51.85	
Platinum.....	39	2,560	0.00	62	3,534	0.00	62	0.00	3,534	0.00	
Silver (f)..... Fine oz.	21,383,979	20,693,704	9.79	16,020,657	3,597	0.00	9	1.037	2,891,230	40.51	
Tungsten concentrates..... Lb.	27,088	11,700	0.05	27,088	17,802,474	10.07	27,088	100.00	11,700	13.97	
Zinc.....	35,083,175	2,862,436	1.35	32,194,707	2,362,448	1.34	2,888,468	8.23	499,988	17.47	
Total.....		114,549,152	54.21		73,262,793	41.46			41,286,359	36.04	
<i>Non-metallic.</i>											
Actinolite..... Tons.	228	2,508	0.00	80	880	0.00	148	64.91	1,628	64.91	
Arsenic, white and in ore.....	3,560	563,639	0.27	3,389	509,924	0.29	171	4.80	5,715	9.53	
Asbestos.....	141,462	8,936,804	4.23	136,765	10,909,452	6.17	4,697	3.32	1,972,648	22.07	
Asbestos.....	16,797	33,993	0.01	22,471	65,917	0.03	5,674	33.78	31,924	93.91	
Chromite.....	21,904	867,122	0.41	8,541	228,898	0.13	13,453	61.17	638,224	73.60	
Coal.....	14,977,926	55,192,896	26.12	13,681,218	54,413,349	30.80	1,296,708	8.66	779,547	1.41	
Corundum.....	137	26,112	0.01	14,679	86,231	0.04	137	100.00	26,112	100.00	
Feldspar.....	18,782	112,728	0.05	15,063	97,837	0.05	4,103	21.85	26,497	23.51	
Fluorspar.....	7,362	156,029	0.07	5,063	97,837	0.05	2,299	31.22	58,192	37.30	
Graphite.....	3,114	248,870	0.12	1,360	100,221	0.05	1,794	56.33	148,649	59.73	
Graphite, artificial.....	904			179			725	80.2			
Grindstones.....		83,005	0.04		60,516	0.03		1,052	34.24	22,489	27.09
Gypsum.....	3,072	823,006	0.39	2,020	1,215,287	0.69	146,776	96.38	392,281	47.66	
Magnesite.....	39,365	1,016,765	0.48	299,063	328,465	0.19	28,092	71.36	688,300	67.70	
Magnesium sulphate.....	1,949	14,565	0.01	11,738	9,115	0.01	1,211	62.13	5,450	37.42	
Manganese.....	440	6,230	0.00	661	14,159	0.01	221	50.23	7,929	127.27	
Mica.....	747	271,550	0.13	2,754	273,788	0.15			2,238	0.82	

Comparative Statement of Mineral Production for Years 1918 and 1919—*Concluded.*

Product.	1918.			1919.			Increase (+) or Decrease (—).		Increase (+) or Decrease (—).
	Quantity.	Value (a).	Per cent of total.	Quantity.	Value (a).	Per cent of total.	Quantity.	%	
		\$			\$			\$	
Mineral pigments—									
Barytes.....	640	10,165	.....	468	8,154	.....	—	172	26.88
Oxides.....	17,317	112,440	.....	11,862	113,427	.....	—	5,455	31.50
Mineral water.....	154,468	154,468	.....	19,937,769	4,176,037	2.36	—	202,540	1.01
Natural gas (g)	20,140,309	4,350,940	2.06	986	6,561	.....	—	986	.....
Peat.....	304,741	885,143	0.42	240,466	736,324	0.42	—	64,275	21.09
Petroleum.....	140	1,200	.....	24	331	.....	—	116	82.85
Phosphate.....	411,616	1,705,219	0.81	176,487	522,704	0.30	—	235,129	57.12
Pyrites.....	268,155	629,813	0.30	94,991	527,635	0.30	—	173,164	64.58
Quartz.....	131,727	1,285,039	0.61	148,301	1,397,929	0.79	—	16,574	12.58
Salt.....	.....	.....	.....	48	336	.....	—	48	.....
Strontium.....	.....	119,197	.....	18,642	116,295	.....	—	473	2.60
Talc.....	18,169	12,500	.....	565	11,300	.....	—	65	13.00
Tripolite.....	500	.....	.....	.....	.....	.....	—	.....	.....
Total.....	.....	77,621,946	36.74	.....	76,002,087	43.02	—	.....	.....
Structural Materials and Clay Products.									
Cement, portland.....	3,591,481	7,076,503	3.35	4,995,257	9,802,433	5.55	+	1,403,776	39.09
Clay products—									
Brick, common.....	164,970,087	1,879,811	0.89	291,469,996	3,850,219	2.18	+	126,499,909	76.68
Brick, pressed.....	40,146,536	639,083	0.30	74,423,703	1,304,162	0.74	+	34,277,167	85.38
Brick, moulded and ornamental.....	357,793	28,296	.....	364,682	10,175	.....	+	6,889	1.93
Fireclay, and fireclay products.....	.....	404,824	0.19	.....	389,354	0.22	—	.....	.....
Fireproofing.....	28,087	226,798	.....	41,406	345,382	0.20	+	13,319	47.42
Hollow building blocks.....	1,402,158	40,876	.....	1,984,848	76,673	.....	+	582,690	41.56
Kaolin.....	863	19,299	.....	759	13,744	.....	—	104	12.05
Pottery.....	.....	130,242	.....	.....	185,474	.....	—	.....	.....
Sewerpipe.....	36,574	699,774	0.33	62,821	1,074,146	0.61	+	26,247	71.76
Terra-cotta.....	174,752	15,146	.....	.....	40,527	.....	+	.....	.....
Tile, drain.....	19,762,101	499,340	0.24	20,078,000	616,510	0.35	+	315,899	1.60
Lim.....	6,363,851	1,876,025	0.89	7,147,504	2,310,607	1.31	+	783,553	12.31
Sand-lime brick.....	14,586,324	186,066	.....	33,553,699	484,854	0.27	+	18,964,375	129.98
Sand and gravel.....	11,262,282	2,367,018	1.12	10,364,481	2,680,460	1.52	+	897,801	7.97
Slate.....	933	5,124	.....	1,632	10,853	.....	+	699	.....
Squares.....	.....	.....	.....	.....	.....	.....	+	.....	.....
Total.....	.....	.....	.....	.....	.....	.....	—	1,619,859	2.09
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									
Total.....									

EXPORTS AND IMPORTS.

A very large portion of the mineral production of Canada is exported for consumption or refining outside of Canada. On the other hand considerable quantities of mine products, chiefly those which have been refined or subject to partial treatment, or in the form of manufactured goods ready for consumption, are imported.

The total value of the exports of products of the mine, including direct mine products and manufactures thereof, in 1919 was \$182,698,777, compared with \$174,558,546 in 1918, according to records compiled from the Monthly Reports of the Trade of Canada published by the Department of Trade and Commerce. The classification is that used in the Trade reports.

A revision of the classification makes comparison in detail with previous records difficult. Of the total exports in 1919, about \$58,000,000 can be attributed to metals either in crude or refined metallic form or contained in ores or some form of metallurgical product exported for further refining. About \$26,000,000 is attributed to asbestos, coal, mica, and various other non-metallic minerals. About \$10,000,000 is attributed to chemical products such as cyanamid, calcium carbide, ammonium sulphate, etc. The balance, over \$88,000,000, is made up largely of manufactured products, chiefly manufactures of iron and steel, such as agricultural implements, machinery, boilers and locomotives, rolling-mill products, wire, etc.

A great variety of mineral products, chiefly in the manufactured or semi-manufactured condition, are annually imported into Canada. These imports increased in value with great rapidity during the ten years preceding 1913. During the next two years, however, there was a falling off, but in 1916 the imports again increased to a value almost equal to that of 1913. The total value of these imports during the calendar year 1919 amounted to \$324,263,177, as compared with a value of \$356,990,627 in 1918; \$354,313,551 in 1917; \$256,346,726 in 1916; \$146,465,510 in 1915; \$181,675,667 in 1914; and \$259,299,745 in 1913.

It is perhaps significant that of the total value of these imports in 1919 over one-half consisted of iron and steel goods and about 29 per cent of coal, coke and petroleum.

Exports of Products of the Mine and Manufactures of Mine Products, Calendar Years 1918 and 1919.

Products.	1918.		1919.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
<i>Iron and its Products:</i>				
Chromite (chromic iron).....Tons	15,831	353,616	9,078	198,733
Iron ore....."	130,250	650,502	14,480	78,490
<i>Agricultural Implements:</i>				
Cream separators and parts.....\$		115,120		266,764
Harvesters and binders.....No.	5,549	989,031	14,136	2,773,756
Hayrakes....."	1,126	43,315	1,862	73,516
Mowing machines....."	8,694	566,878	14,250	918,635
Reapers....."	457	39,573	1,009	95,113
Cultivators....."	3,383	147,724	11,250	638,741
Drills....."	8,997	791,590	8,227	856,642
Harrows....."	5,104	141,871	11,376	294,111
Ploughs and parts of.....\$		1,536,550		2,833,743
Seeders.....No.	37	3,432	352	38,307
Garden and farm tools.....\$			*	247,697
Spades and shovels....."			*	219,368
Threshing machines, separators and parts.....No.	478	219,174		2,184,605
Other agricultural implements and machines.....\$		371,667		333,232
Parts of agricultural implements and machines, n.o.p....."		832,965		988,041
<i>Boilers, Engines, Pumps and Windmills:</i>				
Gasoline engines and parts of.....No.	1,395	271,173	2,706	1,184,667
Locomotives and parts of....."			130	5,874,091
<i>Cutlery and Hardware:</i>				
Bolts and nuts.....Cwt.			9,211	84,545
Cutlery.....\$			*	2,025,493
Hardware, n.o.p....."		1,995,603		1,580,628
Nails, brads, spikes and tacks of all kinds.....Cwt.			126,823	761,988
Nails, wire.....(a)		6,294,195	204,772	1,302,413
Needles and pins of all kinds.....\$			*	72,793
Screws of all kinds....."			*	46,820
<i>Machinery (except agricultural):</i>				
Dynamos, generators and motors..\$			*	105,531
Lawnmowers.....No.			4,879	29,872
Linotype machines and parts of..\$		5,937		30,957
Sewing machines and parts of....."		50,054		568,224
Typewriters.....No.	3,461	192,401	3,830	297,948
Washing machines, domestic and wringers.....\$		14,447		32,096
Other machinery and parts of, n.o.p."		5,349,457		5,852,327
<i>Rolling Mill products:</i>				
Bars and rods.....Tons.	105,285	10,312,657	52,191	3,394,894
Metallic shingles and laths and corrugated roofing.....\$		13,823		18,514
Rails.....Tons.	12,952	575,062	30,737	1,297,836
Structural steel....."			5,515	465,989
Tubes and piping.....\$			*	1,715,707
<i>Smelted Products:</i>				
Billets, ingots and blooms.....Tons.	61,782	2,645,943	28,087	1,731,529
Ferro-manganese and other ferro-products, n.o.p....."	23,781	2,671,434	22,449	1,229,341
Ferro-silicon....."				
Pig-iron....."	2,130	169,495	63,605	1,820,260
<i>Vehicles:</i>				
Aeroplanes and parts.....\$		5,679,674		2,480,463
Automobiles, freight.....No.	10,361	5,076,076	3,352	1,673,256
" passenger....."			19,597	11,580,260
" parts of.....\$		919,738		3,490,577
Bicycles.....No.	93	4,951	121	4,968
" parts of.....\$		91,807		114,683
Cars and coaches, railway, and parts of....."			*	1,495,402
Motor vehicles, n.o.p.....No.			9	4,130
Other vehicles, n.o.p.....\$				103,387

*Nine months, 1919.

(a) Includes wire, barbed fencing, fencing woven and other wire, n.o.p., in 1918.

Exports of Products of the Mine and Manufactures of Mine Products, Calendar Years 1918 and 1919—Continued

Products.	1918.		1919.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
<i>Wire:</i>				
Wire, barbed..... Cwt.	(a)		24,960	167,142
Wire, woven, fencing..... \$	(a)			88,140
Other wire, n.o.p..... "	(a)			2,059,204
<i>Other Iron and Steel Products:</i>				
Castings, n.o.p..... \$		516,742		296,236
Forgings..... "			*	1,612,736
Furniture..... "			*	41,587
Gas buoys..... "				
Guns, rifles and firearms of all kinds..... "		1,118,562		2,735,086
Lamps and lanterns..... "				80,129
Scales and weighing beams..... "			*	70,619
Scrap-iron and steel..... Tons.	51,545	853,097	245,214	3,779,179
Stoves of all kinds..... \$		84,640		124,331
Tinware..... "		195,812		66,076
Tools, hand or machine, n.o.p..... "		1,962,883		1,059,992
Other manufactures of iron and steel, n.o.p..... "		8,907,060		6,640,007
<i>Non-Ferrous Metals and their Products:</i>				
Aluminium bars, blocks, etc..... Cwt.	216,165	7,223,570	145,763	4,455,031
Aluminium, manufactures of..... \$		197,670		59,339
Arsenic, metallic..... Cwt.	53,448	393,883	50,128	355,654
Arsenic, n.o.p..... "				
Brass, old and scrap..... "	91,849	1,454,451	96,569	1,275,448
Brass rods, sheets, tubing, etc..... "	26,368	703,227	5,355	173,654
Brass valves..... \$			*	236,839
Copper, fine contained in ore, matte, regulus, etc..... Cwt.	733,964	9,221,681	408,513	5,316,151
Copper, blister..... "			*	199,561
Copper, old and scrap..... "	8,953	171,988	31,170	537,225
Copper, in pigs, bars and sheets, etc..... "	467,807	11,378,440	181,923	4,186,549
Copper, wire and cable, insulated... \$			*	867,360
Lead, metallic, contained in ore, etc..... Cwt.	226,841	1,321,890	131,429	616,278
Lead, in pigs, etc..... "	74,617	668,807	113,268	772,734
Cobalt alloys..... Lbs.	73,580	298,496	3,402	14,878
Cobalt metallic..... "	292,015	748,705	106,835	259,624
Nickel, fine, contained in ore, matte, speiss..... Cwt.	857,677	10,556,040	303,954	4,785,172
Nickel, fine..... "	17,108	707,206	106,210	3,292,420
Gold-bearing quartz dust, nuggets and bullion direct from milling operations..... \$		10,040,813		5,037,123
Jewellers' sweepings..... "				262,643
Jewellery of all kinds, n.o.p..... "				260,687
Platinum contained in concentrates or other forms..... Oz.	12	798	325	28,815
Platinum, old and scrap..... "	185	20,094	346	33,814
Silver, contained in ore, concentrates, etc..... "	4,225,007	3,735,830	2,854,928	2,850,592
Silver, bullion..... "	15,132,069	14,647,072	12,550,233	13,560,205
Zinc ore..... Tons.	10,545	476,791	6,630	296,212
Zinc spelter..... Cwt.			*	701,249
<i>Other Non-Ferrous Metal. Products:</i>				
Electric apparatus:				
Batteries, telegraph and telephone apparatus..... \$				1,175,226
Electric apparatus, n.o.p..... "				
Electrotypes and stereotypes..... "				15,178
Molybdenum..... Cwt.	3,516	402,435	1,135	84,226
Ore, antimony..... Tons.	26	1,430	56	8,420
Ore, manganese..... "	784	29,208	603	13,401
Ores, other, n.o.p..... "	26,828	105,628	8,727	8,512
Plated ware, n.o.p..... \$		21,735		119,326
Pyrites..... Tons.	240,453	949,067	89,089	388,508
Metals, other, unmanufactured..... \$				39,182
Metals, other, manufactured, n.o.p..... "		3,920,919		1,574,716

*Nine months, 1919.

(a) Includes wire, barbed fencing, fencing woven and other wire, n.o.p., in 1918.

Exports of Products of the Mine and Manufactures of Mine Products, Calendar Years 1918 and 1919—Continued

Products.	1918.		1919.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
<i>Non-Metallic Minerals and their Products (except chemicals):</i>				
Asbestos..... Tons.	119,454	7,786,710	119,122	9,625,695
Asbestos, sand and waste..... "	22,144	228,059	25,306	260,775
Asbestos, manufactures of..... \$		40,763		232,501
<i>Clay and Clay Products:</i>				
Bricks..... M.	3,277	34,593	4,770	52,050
Clays, unmanufactured..... Cwt.			5,901	3,672
Clay, manufactures of..... \$		129,691		84,953
Earthenware and all manufactures of..... "		10,633		23,579
<i>Coal and Its Products:</i>				
Coal..... Tons.	1,817,195	9,405,423	2,070,050	12,438,885
Coke..... "	29,612	223,629	14,709	129,703
Tar and pitch..... \$		67,646		61,654
<i>Graphite and Its Products:</i>				
Graphite or plumbago, crude and refined..... Cwt.	13,278	32,710	20,055	72,917
Plumbago, manufactures..... \$		205,993		23,970
<i>Mica and Its Products:</i>				
Mica, rough cobbled and thumb trimmed..... Cwt.	8,658	410,000	54,821	641,366
Mica, scrap and waste..... "				
Mica, splittings..... }				
Mica, plate and manufactures of (micante)..... \$			*	596
<i>Mineral waters:</i>				
Mineral water, natural, not in bottles Gal.	55	41	122	89
Mineral and aerated water in bottles \$		20,173		59,580
<i>Petroleum and Its Products:</i>				
Oil, coal and kerosene, crude..... Gal.	270,302	28,415	603,748	40,648
Oil, coal and kerosene, refined..... "	1,946,967	206,675	2,846,293	287,170
Oil, gasoline and naphtha..... "	91,229	28,778	1,566,707	428,754
Mineral wax..... Cwt.	36,644	347,823	71,259	626,799
<i>Stone and Stone Products:</i>				
Abrasives, natural, n.o.p., in ore or bulk, crushed or ground, including infusorial earth, rotten stone, tripoli, etc..... Cwt.			8,529	10,743
Abrasives, artificial, crude, including carborundum..... \$				
Abrasives, artificial, made up into wheels, stones, etc..... \$		2,028,839		1,520,218
Corundum..... Tons.	143	18,231		
Grindstones, manufactured..... \$		46,872		38,682
Stone for the manufacture of grindstones, rough..... Tons.	265	276		
Freestone, limestone and other building stone, unwrought..... "	62,683	107,690	16,859	23,899
Granite and marble, unwrought.... "	1,042	5,059	846	7,118
Stone of all kinds, dressed..... \$		4,598		10,108
Cement..... "		13,752		465,954
Gypsum, or plaster, crude..... Tons.	67,824	80,843	148,394	199,857
Lime..... Cwt.	149,657	70,930	193,073	128,810
Plaster of Paris, ground, and prepared wall plaster..... "		101,618		140,235
Crushed stone..... Tons.	1,526	1,983	13,176	12,990
Sand and gravel..... "	902,750	229,957	1,074,341	131,140
<i>Other Non-Metallic Minerals:</i>				
Carbon electrodes..... \$			*	691,747
Feldspar..... "		101,187		104,285
Fluorspar..... Tons.			697	9,616
Glass and glassware, n.o.p..... \$				596,613
Magnesite, crude..... "				
Magnesite, calcined, dead burned, etc..... "		816,553		232,377
Salt..... Cwt.	17,856	16,743	12,333	14,573
Talc, crude..... \$		208,301		210,150
Talc, refined..... }				
Other non-metallic minerals and products..... "				

* Nine months, 1919

Exports of Products of the Mine and Manufactures of Mine Products, Calendar
Years 1918 and 1919—*Concluded*

Products.	1918.		1919.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
<i>Chemicals and Allied Products—</i>				
Acid sulphuric..... Cwt.	111,992	165,579	108,942	108,392
Cyanamid..... " "	921,274	2,346,918	1,174,584	4,104,052
Phosphate rock..... Tons.			48	741
Other fertilizers, manufactured, n.o.p..... \$		190,697		241,934
Mineral pigments, iron oxide, ochres, etc..... Cwt.	15,389	18,377	15,349	25,229
Acetate of lime..... "	42,859	216,613	104,265	257,857
Ammonium sulphate..... "	173,926	1,027,558	369,763	1,821,880
Calcium carbide..... "	1,172,547	4,369,512	956,556	3,960,410
Cobalt oxides and cobalt salts..... Lbs.	588,229	853,737	468,225	731,506
Magnesium sulphate..... Cwt.			*	15
Potash, crude..... "			*	633
		174,558,546		182,698,777

* Nine months, 1919.

IMPORTS.

Imports of Products of the Mine and Manufactures of Mine Products—Calendar Years 1917, 1918, and 1919.

Products.	1917. Value.	1918. Value.	1919. Value.
	\$	\$	\$
Alumina.....	1,866,240	2,071,060	1,565,264
Alum, alum cake and chloralum.....	423,903	382,132	228,250
Aluminium and manufactures.....	560,481	383,985	594,694
Ammonia, nitrate of.....	283,853	19,019	205,346
Ammonia, sulphate of.....	26,062	1,273	12,129
Antimony regulus.....	61,732	92,678	81,257
Antimony salts.....	6,295	18,986	8,548
Arsenic, oxide and sulphide of.....	54,136	33,573	27,938
Asbestos.....	537,431	604,703	656,037
Asphaltum.....	454,403	428,173	469,016
Bells and gongs.....	84,021	77,729	88,914
Bismuth.....	12,922	13,496	9,569
Blanc fixé and satin white.....	90,482	92,241	114,732
Blast furnace slag.....	7,106	18,506	416
Borax.....	381,294	199,210	227,638
Brick and tile.....	442,455	303,596	520,708
Brick, fire, of a kind not made in Canada, and n.o.p.....	3,156,591	3,712,677	1,461,175
Bromine and bromides.....	530	1,032	182
Burrstones.....	910	1,571	3,421
Cement, Portland, and manufactures.....	28,356	28,360	64,443
Chalk, Cornwall stone, feldspar, fluorspar, magnesite, mica, schist.	264,220	256,858	49,658
Clays: china, fire, pipe, and all other.....	416,209	554,353	362,150
Coal: anthracite, bituminous, slack, and run-of-mine.....	70,562,357	71,650,584	61,160,799
Coke.....	6,517,260	8,975,445	2,405,740
Coke, ground, for electric batteries.....	15,239	22,849	26,615
Copper and manufactures of.....	10,015,561	6,372,412	3,599,297
Cryolite.....	101,141	167,586	143,141
Crucibles, clay or plumbago.....	798,044	113,856	59,239
Chloride of lime.....	100,834	162,748	304,691
Cyanides of potassium, sodium, cyanogen or cpd. of bromine.....	505,294	459,136	251,863
Diamonds, unset and bort.....	1,368,887	1,367,801	3,632,026
Earthenware.....	2,595,582	2,163,455	2,925,295
Earths, crude.....	3,917	2,514	19,329
Electric carbons.....	65,225	57,151	37,292
Emery and manufactures.....	632,836	659,912	354,428
Fertilizers, compound or manufactured.....	1,045,140	1,054,962	1,201,121
Flint, quartz, silix, etc.....	77,104	121,879	114,727
Foundry facings.....	47,416	45,798	22,700
Fullers' earth.....	17,004	16,969	19,893
Fossils.....	6,943	11,324	16,395
Gannister.....	23,954	12,465	877
Gold and silver and manufactures of, including silver bullion.....	2,921,018	824,418	4,067,275
Graphites and manufactures of.....	171,209	226,777	87,574
Grindstones.....	185,607	297,287	281,066
Gypsum and plaster of Paris.....	35,460	22,065	47,455
Hydro-fluo-silicic acid.....	97	80	747
Iron and steel—Total, 1917: 187,191,534			
1918: 178,340,779			
1919: 181,332,310			
Pig-iron and kentledge.....	2,764,165	2,102,435	1,022,871
Ferro products and chrome steel.....	2,045,595	4,355,109	943,584
Ingots, blooms, billets, puddled bars, etc.....	1,401,782	262,210	494,101
Scrap iron and scrap steel.....	454,079	775,526	482,963
Plates and sheets.....	17,582,700	14,114,139	12,820,340
Tin plates and sheets.....	9,985,631	11,403,887	6,436,047
Bars, rods, hoops, bands, etc.....	22,567,187	17,849,982	12,771,836
Structural iron and steel.....	15,282,012	11,004,159	11,142,997
Rails and connexions.....	944,595	561,970	774,985
Pipes and fittings.....	143,124	128,257	90,879
Nails and spikes.....	892,021	404,913	228,580
Wire.....	4,409,376	3,760,004	4,595,101
Forging castings and manufactures.....	5,976,313	3,829,760	3,325,859
Other iron and steel products.....	102,742,954	107,808,428	126,202,167
Iron ore.....	5,124,889	5,895,974	4,706,440

IMPORTS.

Imports of Products of the Mine and Manufactures of Mine Products—Calendar Years 1917, 1918, and 1919—*Continued.*

Products.	1917. Value.	1918. Value.	1919. Value.
	\$	\$	\$
Iron sand.....	36,737	67,528	10,247
Kainite.....	38,828	4,931	22,627
Lead and manufactures; litharge.....	1,732,423	1,350,689	1,022,265
Lime.....	78,251	53,745	53,190
Lithographic stone.....	3,921	2,757	10,698
Manganese, oxide of.....	92,616	93,477	89,314
Magnesia.....	16,186	13,200	61,740
Mercury or quicksilver.....	76,322	68,903	31,573
Metallic alloys:—			
Babbitt metal.....	36,444	27,062	26,863
Brass and manufactures of.....	5,328,659	4,647,872	3,964,339
Britannia metal and manufactures.....	20,513	25,898	15,105
German silver, nickel, and nickel silver.....	519,064	443,103	479,022
Type metal.....	1,193	85	200
Mineral and bituminous substances.....	647,444	914,442	629,865
Mineral water, including aerated water.....	108,444	105,967	113,743
Nickel anodes.....	8,348	3,734	5,237
Ochres, etc.....	417,502	475,853	584,524
Ore, cobalt.....			43
Ores of metals, n.o.p.....	3,221,267	1,276,092	444,844
Paraffin wax.....	140,722	209,916	108,049
Paraffin candles.....	75,257	64,033	59,151
Petroleum and products of.....	22,741,709	30,475,621	29,392,823
Phosphates (fertilizer).....	62,543	90,363	30,267
Platinum and manufactures of.....	114,279	31,140	160,885
Potash and manufactures of.....	135,836	118,900	143,919
Precious stones.....	192,748	186,365	726,773
Pumice.....	34,162	36,938	29,910
Salt.....	1,088,205	1,267,169	1,310,129
Saltpetre.....	163,556	204,121	35,889
Sand and gravel.....	312,403	435,992	200,428
Slate and manufactures of.....	106,893	133,054	142,977
Sand paper.....	331,776	317,048	362,069
Soda products: barilla, bichromate, caustic, sal and salt cake.....	3,096,578	3,656,459	2,208,460
Stone and manufactures of (including marble).....	764,658	732,162	960,925
Soda, nitrate of.....	1,935,698	4,077,903	411,423
Sulphate of iron (copperas).....	9,952	7,783	16,761
Sulphur and phosphorus.....	1,549,828	2,093,936	1,035,151
Sulphuric acid.....	15,680	208,288	38,759
Tar, coal, and pine.....	208,065	256,372	236,216
Tin and manufactures of (including tinware).....	5,656,665	4,204,532	3,367,900
Whiting and prepared chalk.....	261,812	270,197	283,323
Zinc and manufactures of.....	3,641,272	2,804,027	1,865,531
	354,313,551	356,990,627	324,263,177

Summary of Imports.

	1916.		1917.		1918.		1919.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Brass and mfgs.....		\$ 4,676,374		\$ 5,328,659		\$ 4,647,872		\$ 3,964,339
Coal.....	17,580,603	38,289,666	20,857,460	70,562,357	21,678,587	71,650,584	17,308,837	61,150,799
Coke.....	757,116	2,229,078	970,106	6,517,260	1,165,590	8,975,445	383,374	2,405,740
Copper and mfgs.....		7,566,080		10,015,561		6,372,412		3,599,297
Iron ore.....	2,339,677	4,419,013	2,251,397	5,124,889	2,200,838	5,895,974	1,783,098	4,706,440
Iron and steel mfgs.....		129,040,248		187,191,534		178,340,779		181,332,310
Lead and mfgs.....		2,077,896		1,732,428		1,350,689		1,022,265
Petroleum and mfgs.....		14,604,476		22,741,709		30,475,621		29,382,823
Structural materials.....	292,426,121	5,562,220	379,148,006	7,901,398	420,728,933	8,117,394	451,261,046	6,691,291
Tin and mfgs.....		2,999,675		5,656,665		4,204,532		3,367,900
Zinc and mfgs.....		3,690,577		3,641,272		2,804,027		1,865,531
All other.....		41,191,423		27,899,819		34,155,298		24,754,342
Total.....		256,346,726		354,313,551		356,990,627		324,263,177

PRODUCTION BY PROVINCES.

Summaries of the mineral production by provinces in 1918 and 1919 are shown in the accompanying tables. The first shows the total production in the several provinces and the percentages of each for the past three years.

In comparing the relative production of the various provinces it should be remembered that Nova Scotia is not credited with the large production of pig-iron and steel at Sydney and Sydney Mines, which is made almost entirely from imported iron ores and is not naturally credited as Canadian mine product. Similarly a large proportion of the pig-iron production in Ontario is excluded from the total value, because it is derived from imported ores. The province of Quebec, also, is not credited with the production of aluminium at Shawinigan Falls, which is made from imported bauxite.

Mineral Production by Provinces, 1917, 1918, and 1919.

Province.	1917.		1918.		1919.	
	Value of production.	Per cent of total.	Value of production.	Per cent of total.	Value of production.	Per cent of total.
	\$		\$		\$	
*Nova Scotia.....	21,104,542	11.13	22,317,108	10.56	23,445,215	13.27
New Brunswick.....	1,435,024	0.76	2,144,017	1.01	1,770,945	1.00
Quebec.....	17,400,077	9.18	19,605,347	9.28	21,267,947	12.04
Ontario.....	89,066,600	46.96	94,694,093	44.82	67,917,998	38.44
Manitoba.....	2,628,264	1.39	3,120,600	1.53	2,868,378	1.62
Saskatchewan.....	860,651	0.45	1,019,981	0.48	1,521,964	0.86
Alberta.....	16,527,535	8.71	23,109,987	10.94	21,087,582	11.94
British Columbia.....	36,141,926	19.06	42,935,333	20.27	34,865,427	19.73
Yukon.....	4,482,202	2.36	2,355,631	1.11	1,940,934	1.10
Dominion.....	189,646,821	100.00	211,301,897	100.00	176,686,390	100.00

*Includes a small production of lime from Prince Edward Island.

Mineral Production of Nova Scotia, 1918 and 1919.

Product.		1918.		1919.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Barytes.....	Tons.	580	9,145	468	8,154
Coal.....	"	5,818,562	21,095,470	5,720,373	22,078,726
Grindstones.....	"	256	8,000	283	9,000
Gold.....	Ozs.	1,176	24,310	850	17,571
Gypsum.....	Tons.	49,365	115,976	163,852	250,174
Manganese.....	"			45	3,600
Molybdenite.....	Lbs.	180	207		
Tripolite.....	Tons.	500	12,500	565	11,300
Tungsten concentrates.....	Lbs.	1,063	372		
Clay products.....			303,515		432,900
Lime.....	Bus.	748,314	149,663	366,543	73,309
Salt.....	Tons.			174	2,188
Stone.....			478,721		413,194
Other products.....			119,229		145,096
Total.....			22,317,108		23,445,215

The total production of blast furnace pig-iron in Nova Scotia in 1919 was 285,087 tons valued at \$7,141,641 and in 1918, 415,870 tons valued at \$10,451,400.

Mineral Production of New Brunswick, 1918 and 1919.

Product.		1918.		1919.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Coal.....	Tons.	268,212	1,331,710	179,108	794,761
Grindstones.....	"	2,816	75,005	1,737	51,516
Gypsum.....	"	27,225	214,114	42,409	315,656
Natural gas.....	M. cu. ft.	792,396	107,842	682,890	120,510
Petroleum.....	Bls.	3,009	7,402	4,225	13,141
Tungsten concentrates.....	Lbs.	22,000	8,693		
Clay products.....			39,055		52,941
Lime.....	Bus.	482,548	221,935	468,533	223,193
Stone.....			99,044		125,294
Other products.....			39,217		73,933
Total.....			2,144,017		1,770,945

Mineral Production of Quebec, 1918 and 1919.*

Product.		1918.		1919.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Copper.....	Lbs.	5,869,649	1,445,577	2,691,695	503,105
Gold.....	Ozs.	1,939	40,083	1,470	30,388
Iron ore, sold for export.....	Tons.	6,330	28,211	321	1,005
Lead.....	Lbs.	2,110,059	195,180	2,280,000	158,825
Molybdenite.....	Ozs.	333,318	383,315	83,002	69,203
Silver.....	Ozs.	178,675	172,907	140,926	156,600
Zinc.....	Lbs.	2,802,928	228,691	1,752,000	128,562
Asbestos and asbestic.....	Tons.	158,259	8,970,797	159,236	10,975,369
Chromite.....	"	21,324	835,727	8,541	228,898
Feldspar.....	"	191	4,279	925	13,073
Graphite.....	"	(a) 180	40,018	20	400
Magnesite.....	"	39,365	1,016,765	11,273	328,465
Mica.....	"	481	229,119		218,437
Mineral water.....			7,609		13,257
Iron oxides.....	Tons.	17,317	112,440	11,862	113,427
Peat.....	"			486	4,811
Phosphate.....	"	140	1,200	22	300
Pyrites.....	"	124,871	507,802	52,746	203,222
Quartz.....	"	1,730	5,383	2,221	7,773
Cement.....	Bls.	1,564,360	3,003,571	2,260,422	4,340,010
Clay products.....			798,058		1,563,832
Kaolin.....	Tons.	863	19,299	759	13,744
Lime.....	Bus.	1,527,784	418,888	1,796,822	493,762
Slate.....	Squares	933	5,124	1,632	10,853
Stone.....			952,402		1,441,919
Other products.....			182,902		248,707
Total.....			19,605,347		21,267,947

*There was also in this Province an important production of aluminium from imported ores.

(a) Includes small production from Baffin Land.

Mineral Production of Ontario, 1918 and 1919.

Product.		1918.		1919.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Cobalt, metallic and in oxide, etc.	Lbs.	1,347,544	3,368,860	530,371	1,325,928
Copper	"	47,074,475	11,593,502	24,346,623	4,550,627
Gold	Ozs.	411,976	8,516,299	505,739	10,454,553
Iron ore, sold for export	Tons.	109,942	464,188	5,562	45,520
Iron, pig, from Canadian ore (a)	"	47,444	1,204,703	38,457	899,406
Lead	Lbs.	1,684,366	155,804	1,487,586	103,625
Molybdenite	"	42,931	49,371		
Nickel	"	92,507,293	37,002,917	44,544,883	17,817,953
Silver	Ozs.	17,198,737	16,643,562	12,117,878	13,465,628
Zinc	Lbs.			147,692	10,838
Actinolite	Tons.	228	2,508	80	880
Arsenious oxide	"	2,482	520,525	2,859	488,706
Barytes	"	60	1,020		
Corundum	"	137	26,112		
Feldspar	"	18,591	108,449	13,754	73,158
Fluorspar	"	7,187	150,779	3,425	59,281
Graphite	"	2,934	208,852	1,340	99,821
Gypsum	"	38,214	151,564	58,899	278,120
Mica	"	266	42,431	325	55,351
Mineral water			145,400		55,958
Natural gas	M cu. ft.	13,029,524	2,884,460	11,024,041	2,690,400
Peat	Tons.			500	1,750
Petroleum	Bls.	288,692	777,737	219,804	625,342
Phosphate	Tons.			2	31
Pyrites	"	268,507	1,133,963	117,011	285,832
Quartz	"	216,539	474,772	60,055	179,549
Salt	"	131,727	1,285,039	148,112	1,395,291
Strontium	"			48	336
Talc	"	18,169	119,197	18,542	115,795
Cement	Bls.	1,220,003	1,976,815	2,023,280	3,650,585
Clay products			2,434,215		4,574,796
Lime	Bus.	2,660,791	762,976	3,578,834	1,143,973
Sand-lime brick	No.	8,081,301	91,902	24,141,399	335,200
Stone			1,079,745		1,936,268
Other products			1,316,426		1,197,497
Total			94,694,093		67,917,998

(a) The total production of blast-furnace pig-iron in Ontario in 1919 was 624,993 tons, valued at \$17,104,151; in 1918, 747,650 tons, valued at \$21,324,857.

Mineral Production of Manitoba, 1918 and 1919.

Product.		1918.		1919.	
		Quantity.	Value.	Quantity.	Value.
			\$		\$
Copper	Lbs.	2,339,751	576,234	3,348,000	625,775
Gold	Ozs.	1,926	39,814	724	14,966
Silver	"	13,316	12,886	20,760	23,069
Tungsten concentrates	Lbs.	177	42		
Calcined gypsum	Tons.	37,483	341,352	32,903	371,337
Clay products			116,417		131,737
Lime	Bus.	462,544	134,725	476,452	147,131
Sand-lime brick	No.	5,395,423	82,438	7,389,300	124,847
Stone			238,251		89,067
Other products			1,578,441		1,340,449
Total			3,120,600		2,868,378

Mineral Production of Saskatchewan, 1918 and 1919.

Product.		1918.		1919.	
		Quantity.	Value.	Quantity.	Value.
Coal.....	Tons	346,847	\$ 722,148	380,169	\$ 820,522
Salt.....	"			15	450
Clay products.....			133,935		270,989
Sand-lime brick.....	No.	512,600	5,126	1,294,000	14,601
Other products.....			158,572		415,402
Total.....			1,019,781		1,521,964

Mineral Production of Alberta, 1918 and 1919.

Product.		1918.		1919.	
		Quantity.	Value.	Quantity.	Value.
Gold, alluvial.....	Oz.	27	\$ 558	24	\$ 500
Coal.....	Tons	5,972,816	20,537,287	4,964,535	18,294,495
Natural gas.....	M. cu. ft.	6,318,389	1,358,638	8,230,838	1,365,127
Petroleum.....	Brl.	13,040	100,004	16,437	97,841
Clay products.....			381,074		571,949
Lime.....	Bush.	80,408	44,141	109,067	41,276
Sand-lime brick.....	No.	600,000	6,600	729,000	10,206
Stone.....			569		3,189
Other products.....			681,116		702,999
Total.....			23,109,987		21,087,582

Mineral Production of British Columbia, 1918 and 1919.

Product.	1918.		1919.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Copper (a).....Lb.	62,865,681	15,482,560	44,502,019	8,317,884
Gold.....Oz.	180,163	3,724,300	167,252	3,457,406
Iron ore sold for export.....Tons.	2,200	6,600		
Lead.....Lb.	47,594,328	4,402,475	40,060,113	2,790,587
Molybdenite....."	1,600	1,840		
Platinum.....Oz.	39	2,560	25	2,150
Silver....."	3,921,336	3,794,755	3,713,537	4,126,556
Zinc.....Lb.	32,280,247	2,633,745	30,295,015	2,223,048
Arsenic.....Tons.	1,078	43,114	530	21,218
Chromite....."	670	31,395		
Coal....."	2,568,589	11,494,681	2,455,933	12,420,445
Fluorspar....."	175	5,250	1,638	38,556
Manganese....."	440	6,230	616	10,559
Magnesium sulphate....."	1,949	14,565	738	9,115
Mineral water....."		1,455		1,800
Pyrites.....Tons.	18,238	63,454	6,730	33,650
Quartz....."	49,886	149,658	32,715	340,313
Talc....."			100	500
Clay products....."		557,921		293,478
Lime.....Bush.	401,562	143,697	351,253	187,963
Stone....."		187,842		217,006
Other products....."		387,236		373,193
Total.....		42,935,333		34,865,427

(a) Smelter recoveries of copper.

Mineral Production of Yukon, 1918 and 1919.

Product.	1918.		1919.	
	Quantity.	Value.	Quantity.	Value.
		\$		\$
Copper.....Lb	619,878	152,663	165,184	30,874
Gold.....Oz.	102,474	2,118,325	90,705	1,875,039
Lead.....Lb.	9,249	856		
Silver.....Oz.	71,915	69,594	27,556	30,621
Tungsten concentrates.....Lb.	3,848	2,593		
Coal.....Tons.	2,900	11,600	1,100	4,400
Total.....		2,355,631		1,940,934

Mineral Production by Provinces, 1899-1919.

Calendar Year.	Nova Scotia.*	New Brunswick.	Quebec.	Ontario.	Manitoba.	Alberta.	Saskatchewan.	Yukon.	British Columbia.	Total.
1899.....	\$ 6,817,274	\$ 420,227	\$ 2,585,635	\$ 9,819,557			\$ 17,108,707		\$12,482,605	\$49,234,005
1900.....	9,298,479	439,060	3,292,383	11,258,099			23,452,330		16,680,526	64,420,877
1901.....	7,770,159	467,985	3,759,984	13,970,010			19,297,940		20,531,833	65,797,911
1902.....	10,636,549	607,129	3,743,636	14,619,091			16,127,400		17,448,031	63,231,836
1903.....	11,431,914	580,495	3,585,938	14,160,033			14,082,986		17,899,147	61,740,513
1904.....	11,212,746	559,913	3,688,482	12,582,843			12,713,613		19,325,174	60,082,771
1905.....	11,507,047	559,035	4,405,975	18,833,292			11,387,642		22,386,008	69,078,999
1906.....	12,894,303	646,328	5,242,058	25,111,682			10,092,726		25,299,600	79,286,697
1907.....	14,532,040	664,467	6,205,553	30,381,638	\$ 898,775	\$ 4,657,524	\$ 533,251	\$ 3,335,898	25,656,056	86,865,202
1908.....	14,487,108	579,816	6,372,949	30,623,812	584,374	5,122,505	413,212	3,669,290	23,704,035	85,557,101
1909.....	12,504,810	657,035	7,086,265	37,374,577	1,193,377	6,047,447	456,246	4,032,678	22,479,006	91,831,441
1910.....	14,195,730	581,942	8,270,136	43,538,078	1,500,359	8,996,210	498,122	4,764,474	24,478,572	106,823,623
1911.....	15,409,397	612,830	9,304,717	42,796,162	1,791,772	6,662,673	636,706	4,707,432	21,299,305	103,220,994
1912.....	18,922,236	771,004	11,656,998	51,985,876	2,463,074	12,073,589	1,165,642	5,833,242	30,076,635	135,048,290
1913.....	19,376,183	1,102,613	13,473,534	59,167,749	2,214,496	13,034,046	881,142	6,276,737	28,086,312	145,634,812
1914.....	17,584,639	1,014,570	11,836,929	53,034,677	2,413,489	12,684,234	712,313	5,418,185	24,164,039	128,863,075
1915.....	18,088,342	903,467	11,619,275	61,071,287	1,318,387	9,909,347	451,933	5,057,708	28,089,425	137,109,171
1916.....	20,042,262	1,118,187	14,406,598	80,461,323	1,823,576	13,297,543	590,473	5,491,610	39,969,962	177,201,534
1917.....	21,104,542	1,435,024	17,400,077	89,066,600	2,628,264	16,527,535	860,651	4,482,202	36,141,926	189,646,821
1918.....	22,317,108	2,144,017	19,605,347	94,694,093	3,120,600	23,109,987	1,019,781	2,355,631	42,935,333	211,301,897
1919.....	23,445,215	1,770,945	21,267,947	67,917,998	2,868,378	21,087,582	1,521,964	1,940,934	34,865,427	176,686,390

*Includes a small production from Prince Edward Island.

MINE PRODUCTION.

The statistics of mineral production presented in the preceding tables are based, as already explained, in so far as metalliferous ores are concerned, on the actual or probable recovery of refined metals from the ores treated. An endeavour has been made to compile another series of records eliminating as far as possible the metallurgical operations, and to include only the actual quantities of ores or concentrates shipped from mines and the net value of the same. It has not been found feasible, however, to eliminate entirely the metallurgical operations in certain cases, such as the recovery of bullion in placer operations, the recovery of gold bullion from milling ores and of silver bullion by those plants carrying on milling operations as well as mining, there being no commercial basis on which a separation of values could be made.

A record of mine production compiled on this basis is shown in the following tables and includes a record of the tonnage and value of ores, or minerals mined, treated and shipped, the quantities of metals contained in ores shipped and records of labour employed and wages paid. It should be noted that these records cover only active shipping mines and do not include any record of the labour employed in the smelting and refining of ores, nor in blast furnace operations, with the exceptions noted. Previous to 1917 no record was obtained of the labour employed in connection with the production of petroleum, and similar returns in respect to placer mining were not sufficiently complete to be included in the tables. The values of the ores given are in general those furnished by the operators. In certain cases, however, where such values have not been furnished, estimates have been made.

The tables showing the quantities of metals contained in the ores shipped give the total quantities of metals contained without any deductions or allowances being made for smelter or treatment losses.

Mine Production, 1914.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under-ground.	Surface.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Iron ores.....	5	598		364,489	345,410	244,854	542,041
Milling gold ore—							
Bullion shipped.....	44	1,070	1,206	2,603,414	754,732	13	6,101,463
Concentrates.....						6,974	
Silver-cobalt ores—							
Mine bullion shipped.....	29	1,412	1,883	3,207,116	733,174	354	5,665,006
Ore and concentrates.....						16,917	
Nickel-copper ores.....	4	736	1,286	1,693,997	1,000,364	999,908	5,020,003
Copper ores.....		113	180	177,721	119,292	117,762	502,637
Silver-lead-zinc ores—							
Lead ore and concentrate.....	76	394	817	1,110,876	186,646	70,207	2,652,802
Zinc “ “.....						10,893	
Gold-copper-silver ores.....	20	823	1,746	2,512,241	1,857,788	1,647,973	9,580,537
Placer mining—							
Yukon.....						10	5,182,616
British Columbia.....						1	565,000
Alberta.....							992
Total metalliferous.....	187	11,994		11,669,854	4,997,406	3,115,855	44,763,179
Total non-metalliferous.....	451	33,732		22,058,526	17,078,300	14,708,307	43,467,229
Total structural materials.....	1,023	21,129		9,881,316			26,009,227
	1,661	66,855		43,609,696			114,239,635

Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.
	Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Milling gold ore—						
Bullion.....	289,860	85,110				
Concentrates.....	38,717	64,218		90	15,141	
Silver-cobalt ores—						
Mine bullion shipped.....		10,335,527				
Ore and concentrates.....		15,523,608				
Nickel-copper ores.....			60,800,799	36,300,532		
Copper ores.....	1,059	51,440		6,450,899		
Silver-lead-zinc ores—						
Lead ore and concentrate.....	334	2,501,820			50,527,130	
Zinc “ “.....		376,420				9,101,460
Gold-copper-silver ores.....	182,784	761,890		53,771,126		
Placer mining—						
Yukon.....	247,753	55,744				
British Columbia.....	27,332					
Alberta.....	48					
Total.....	787,887	29,755,777	60,800,799	96,522,647	50,542,271	9,101,460

Mine Production, 1915.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under-ground.	Surface.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Antimony ore.....	7	157		55,038	15,318	1,491	83,971
Molybdenite.....	4	52		16,990		37	28,450
Iron ores.....	5	399		230,346	251,742	398,112	774,427
Milling gold ore—							
Bullion shipped.....	50	1,324	1,555	2,893,187	1,180,477	18	8,953,130
Concentrates.....						8,335	711,947
Silver-cobalt ores—							
Mine bullion shipped.....	25	1,008	1,531	2,363,414	588,404	232	3,410,936
Ore and concentrates.....						61,362	8,326,776
Nickel-copper ores.....	9	857	1,745	2,202,536	1,364,048	1,372,724	10,552,673
Copper ores.....	6	173	205	215,065	141,758	142,121	1,026,562
Silver-lead and zinc ores.....	66	328	784	960,894	215,694	73,752	2,958,394
Zinc.....						14,895	540,022
Gold-copper-silver ores.....	33	886	1,694	2,868,449	2,380,709	2,186,646	10,947,059
Placer mining—							
Yukon.....						9	4,776,145
British Columbia.....							770,000
Alberta.....							4,026
Total metalliferous.....	205	12,698		11,805,919	6,138,150	4,259,734	53,864,518
Total non-metalliferous.....	472	30,392		20,257,126	16,594,889	14,481,882	43,373,571
Total structural materials.....	943	13,786		5,657,717			17,920,759
	1,618	56,876		37,720,762			115,158,848

Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Antimony
	Ozs.	Ozs.	Tons.	Tons.	Tons.	Tons.	Tons.
Antimony ore.....							540
Milling gold ore—							
Bullion.....	430,981	87,116					
Concentrates.....	35,779	37,507					
Silver-cobalt ores—							
Mine bullion shipped.....		6,752,183					
Ore and concentrates.....		17,603,943					
Nickel-copper ores.....			43,891	23,318			
Copper ore.....	1,151	64,965		3,538			
Silver-lead-zinc ores—							
Lead ore and concentrate.....	459	2,637,444			24,354		
Zinc ore and concentrate.....		316,731				6,116	
Gold-copper-silver ores.....	202,127	849,784		34,758			
Placer mining—							
Yukon.....	229,803	25,689					
British Columbia.....	37,249						
Alberta.....	195						
Total.....	937,744	28,375,362	43,891	61,614	24,354	6,116	540

Mine Production, 1916.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, con- centrates or minerals shipped.	Net value of shipments.
		Under- ground.	Surface.				
METALLIFEROUS ORES.	No.	No.		\$	Tons.	Tons.	\$
Antimony ore.....	5	116		59,957	14,947	(a) 938	136,360
Molybdenite.....	9	262		122,072	13,522	(b) 78	156,461
Iron ores.....	4	530		376,716	331,822	275,176	715,107
Milling gold ore							
Bullion shipped.....	49	1,304	1,709	3,540,899	1,502,336	21	10,418,052
Concentrates.....						9,340	522,409
Silver-cobalt ores—							
Mine bullion shipped.....	32	1,034	1,561	2,450,614	547,882	171	3,444,736
Ore and concentrates.....						77,453	9,736,490
Nickel-copper ores.....	6	875	1,837	2,824,818	1,566,333	1,566,333	11,766,201
Copper ores.....	12	232	261	293,115	170,666	155,999	1,444,676
Silver-lead and zinc ores.....	84	573	1,070	1,803,633	395,802	84,516	4,568,500
Zinc.....						82,077	1,086,249
Gold-copper-silver ores.....	59	1,259	1,975	4,395,924	2,907,344	2,431,930	18,544,772
Placer mining—							
Yukon.....						9	4,413,958
British Columbia.....							580,500
Alberta.....							1,695
Total metalliferous.....	260	14,598		15,867,748	7,450,654	4,684,041	67,536,166
Total non-metalliferous.....	532	30,541		24,987,562	18,170,207	15,699,830	53,414,983
Total structural materials.....	816	12,465		6,237,168			17,467,186
Total.....	1,608	57,604		47,092,478			138,418,331

(a) Includes refined antimony.

(b) MoS₂ contents of concentrates produced.

Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Antimony
	Ozs.	Ozs.	Tons.	Tons.	Tons.	Tons.	Tons.
Antimony ore.....							429
Milling gold ore—							
Bullion.....	519,202	102,349					
Concentrates.....	30,138	54,136					
Silver-cobalt ores—							
Mine bullion shipped.....		4,982,702					
Ore and concentrates.....		15,690,716					
Nickel-copper ores.....			51,127	25,266			
Copper ores.....	713	65,438		4,638			
Silver-lead-zinc ores.....	784	2,582,952			27,062		
Zinc products.....		363,262				24,249	
Gold-copper-silver ores.....	163,466	905,685		42,126			
Placer mining—							
Yukon.....	211,010	47,703					
British Columbia.....	28,082						
Alberta.....	82						
Total.....	954,477	24,794,943	51,127	72,030	27,062	24,249	429

Mine Production, 1917.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under-ground.	Surface.				
METALLIFEROUS ORES.	No.	No.	No.	\$	Tons.	Tons.	\$
Antimony ore.....	1	46		35,739	8,182	361	22,000
Molybdenite.....	23	501		260,692	26,871	1,554	320,006
Iron ores.....	9	528		509,163	305,330	215,302	758,621
Milling gold ores—							
Bullion shipped.....	45	1,388	1,633	3,687,392	1,303,410	18	9,312,424
Concentrates.....						8,874	365,375
Silver-cobalt ores—							
Mine bullion shipped.....	32	1,079	1,369	2,667,607	527,850	318	7,628,740
Ore and concentrates.....						72,719	10,123,838
Nickel-copper ores.....	6	907	1,737	2,981,896	1,518,783	1,509,841	11,323,808
Silver-lead-zinc ores—							
Lead ore and concentrate.....	87	716	1,198	2,295,090	445,663	46,799	3,866,862
Zinc ore and concentrate.....						116,489	1,323,985
Gold-copper-silver ores.....	83	1,730	2,253	4,667,578	2,554,738	1,878,911	16,048,186
Placer mining—							
Yukon.....	69	890		1,337,063		8	3,210,268
British Columbia.....	34	275		208,589			496,000
Total metalliferous.....	389	16,250		18,650,809	6,690,827	3,851,194	64,900,113
Total non-metalliferous.....	763	32,088		31,398,570	18,438,815	15,468,048	63,354,363
Total structural materials.....	739	10,814		6,609,872			19,837,311
	1,891	59,152		56,659,251	25,129,642	19,319,242	148,091,787

Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Anti-mony.	Molybdenite.
	Ozs.	Ozs.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Antimony ore.....							144	
Molybdenum ore.....								165
Milling gold ore—								
Bullion.....	447,373	77,250						
Concentrates.....	21,905	99,119						
Silver-cobalt ores—								
Mine bullion shipped.....		9,248,717						
Ore and concentrates.....		12,042,990						
Nickel-copper ores.....			52,587	24,521				
Gold-copper-silver ores.....	77,599	782,521		40,479				
Silver-lead-zinc ores—								
Lead ore and concentrate.....	1,033	1,670,064			19,348			
Zinc ore and concentrate.....		465,153				32,328		
Placer mining—								
Yukon.....	176,548	39,723						
British Columbia.....	23,994							
Alberta.....								
Total.....	748,452	24,425,537	52,587	65,000	19,348	32,328	144	165

Mine Production, 1918.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores concentrates or minerals shipped.	Net value of shipments.
		Under-ground.	Surface.				
METALLIFEROUS ORES.	No.	No.	No.	\$	Tons.	Tons.	\$
Molybdenum ore.....	18	196	110	274,945	34,030	461	428,997
Iron ore.....	11	624		693,383	254,424	211,608	885,893
Gold ore—							
Bullion shipped.....	45	1,238	1,541	3,249,578	974,977	18	9,173,037
Concentrates.....						15,112	411,090
Silver-Cobalt ores—							
Mine bullion shipped.....	30	1,044	1,143	2,918,474	521,472	228	6,821,528
Ore and concentrates.....						73,646	9,763,737
Nickel-copper ores.....	6	975	1,449	3,186,909	1,641,617	1,641,617	12,312,128
Copper-gold-silver ores.....	46	1,125	1,723	4,296,649	2,665,548	1,856,899	11,658,397
Silver-lead-zinc ore—							
Lead ore and concentrate	83	647	1,044	1,980,351	428,066	75,256	4,705,573
Zinc “ “						121,200	1,228,195
Placer mining—							
Yukon.....	65	478		878,858		4.5	1,907,702
British Columbia.....	22	128		134,092		0.5	320,000
Alberta.....							558
Total metalliferous.....	326	13,475		17,613,239	6,520,134	3,995,050	59,616,745
“ non-metalliferous.....	787	32,848		39,322,157	19,107,261	16,237,486	77,621,946
“ structural.....	643	9,504		6,989,496			19,130,799
Grand total.....	1,756	55,827		63,924,892	25,627,395	20,232,536	156,369,490

Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Molybdenite.
	Oz.	Oz.	Tons.	Tons.	Tons.	Tons.	Tons.
Molybdenum ore.....							139
Gold ore—							
Bullion.....	441,120	75,176					
Concentrates.....	17,108	118,785					
Silver-cobalt ores—							
Mine bullion shipped.....		6,675,863					
Ore and concentrates.....		9,599,621					
Nickel-copper ores.....			56,980	27,688			
Copper-gold-silver ores.....	128,235	811,912		23,376			
Silver-lead-zinc ores—							
Lead ore and concentrate.....	1,479	2,314,542			23,422		
Zinc “ “	97	431,888				31,513	
Placer mining—							
Yukon.....	101,744	22,892					
British Columbia.....	15,480						
Alberta.....	27						
Total.....	705,290	20,050,679	56,980	51,064	23,422	31,513	139

Mine Production, 1919.

	No. of mines or works.	Men employed.		Wages paid.	Ores or minerals mined.	Metals, ores, concentrates or minerals shipped.	Net value of shipments.
		Under-ground.	Sur-face.				
METALLIFEROUS ORES.	No.	No.	No.	\$.	Tons.	Tons.	\$
Molybdenum ore.....	1	25	80	35,536	7,280	46	69,203
Iron ore.....	5	556		649,517	289,991	195,970	687,386
Gold ore—							
Bullion shipped.....						29	10,972,559
Concentrates.....	28	1,042	1,479	3,506,442	1,212,760	5,229	298,222
Silver-cobalt ores—							
Mine bullion shipped.....						179	4,868,543
Ore and concentrates.....	35	922	1,095	2,556,767	444,471	62,045	7,096,775
Nickel-copper ores.....	7	432	590	1,244,713	572,400	572,400	4,579,200
Copper-gold-silver ores.....	30	951	1,250	3,191,524	1,779,956	1,085,950	9,265,569
Silver-lead-zinc ore—							
Lead ore and concentrate.....						54,508	3,044,839
Zinc “ “.....	67	615	1,000	1,884,338	409,959	135,535	1,049,493
Placer mining—							
Yukon.....	70	382		684,159		41½	1,701,514
British Columbia.....	23	116		93,732			288,650
Alberta.....							500..
Total metalliferous.....	266	10,535		13,846,728	4,716,817	2,111,896	43,922,453
“ non-metalliferous.....	733	34,422		41,674,932	18,047,064	14,641,415	76,002,087
“ structural.....	654	12,270		9,304,045			27,421,510
Grand total.....	1,653	57,227		64,825,705	22,763,881	16,753,311	147,346,050

Content of Shipments.

	Gold.	Silver.	Nickel.	Copper.	Lead.	Zinc.	Molybdenite.
	Oz.	Oz.	Tons.	Tons.	Tons.	Tons.	Tons.
Molybdenum ore.....							41½
Gold ore—							
Bullion.....	529,409	94,327					
Concentrates.....	10,525	168,673					
Silver-cobalt ores—							
Mine bullion shipped.....		4,293,887					
Ore and concentrates.....		6,636,457					
Nickel-copper ores.....			19,356	10,807			
Copper-gold-silver ores.....	121,482	637,020		26,307			
Silver-lead-zinc ores—							
Lead ore and concentrate.....	1,623	2,185,376			16,074		
Zinc “ “.....	90	535,829				29,980	
Placer-mining—							
Yukon.....	87,923	19,783					
British Columbia.....	13,859						
Alberta.....	24						
Total.....	764,935	14,571,352	19,356	37,114	16,074	29,980	41½

Labour and Wages Statistics Covering Non-Metalliferous Mines during 1917, 1918, and 1919.

	1917.			1918.			1919.		
	Number Active Mines or Works.	Number Employed.	Wages Paid. \$	Number Active Mines or Works.	Number Employed.	Wages Paid. \$	Number Active Mines or Works.	Number Employed.	Wages Paid. \$
NON-METALLIC.									
Asbestos and asbestos.....	15	3,114	2,312,110	13	3,074	2,871,643	15	3,567	3,954,407
Chromite.....	9	253	211,105	13	293	223,375	5	138	164,036
Coal.....	329	24,596	25,963,520	381	25,419	32,899,504	370	27,198	34,826,363
Feldspar.....	8	101	55,742	12	143	108,592	12	98	46,870
Fluorspar.....	7	59	28,810	9	125	89,858	4	100	153,034
Graphite.....	282	191,307	191,307	5	413	121,885	4	121	72,098
Grindstones, pulpstones and seythstones.....	5	92	25,052	6	116	45,853	5	95	36,080
Gypsum.....	12	774	445,128	8	435	275,317	13	725	380,105
Magnesite.....	2	296	194,864	4	305	326,417	3	186	98,043
Mica and phosphate.....	28	283	119,440	16	165	84,521	21	147	109,411
Mineral pigments: barytes, and oxides.....	7	109	56,185	16	95	51,735	5	94	43,473
Mineral water.....	22	53	22,246	18	50	17,271	16	36	17,119
Natural gas.....	105	597	520,290	101	711	641,542	99	681	631,567
Petroleum.....	168	270	167,205	153	264	195,141	120	274	210,936
Pyrites (b).....	11	454	451,940	15	617	688,730	11	372	372,620
Quartz.....	12	289	287,817	11	236	319,840	4	111	121,183
Salt.....	10	309	249,073	9	302	286,781	11	329	330,141
All others†.....	8	157	96,736	7	145	74,170	15	150	87,444
Total non-metallic.....	763	32,088	31,398,570	787	32,848	39,322,157	733	34,422	41,674,932
STRUCTURAL.									
Cement.....	9	1,396	1,424,215	10	1,249	1,474,547	10	1,535	1,836,359
Clay products.....	276	3,915	2,174,167	230	3,423	2,131,614	221	4,613	3,356,461
Lime.....	67	770	554,617	65	741	664,367	58	868	829,459
Sand-lime brick.....	13	150	65,175	10	146	69,514	13	286	206,405
Sand and gravel.....	208	1,562	770,167	186	1,558	991,169	192	1,945	997,484
Slate.....	1	19	10,933	1	19	11,298	1	24	17,004
Stone.....	165	3,002	1,610,598	141	2,363	1,646,987	159	2,999	2,060,870
Total structural.....	739	10,814	6,609,872	643	9,504	6,989,496	654	12,270	9,304,045
Total non-metalliferous.....	1,502	42,902	38,008,442	1,429	42,352	46,311,653	1,387	46,692	50,978,977

†Includes in 1917—corundum, manganese, magnesium sulphate, tripolite and talc.
 " 1918—actinolite, corundum, magnesium sulphate, manganese, talc and tripolite.
 " 1919—actinolite, magnesium sulphate, manganese, peat, strontium, tripolite and talc.
 (a) Not collected. (b) Partial.

COBALT.

The Cobalt district of Ontario has been for several years the principal source of the world's supply of cobalt. The recovery of cobalt in Canada is in the form of metallic cobalt, cobalt oxide, cobalt salts, unseparated oxides and stellite, which are produced from the treatment of the cobalt ores and residues in eastern Ontario smelters.

The total production of cobalt contained in smelter products shipped and in cobalt residues exported during 1919 amounted to 530,371 pounds (265.2 tons) valued at \$1,325,928 (\$2.50 per pound), as against 737,157 pounds (368.6 tons), valued at \$1,842,893 (\$2.50 per pound), in 1918.

The 1919 production included: (a) 113,943 pounds of metallic cobalt, valued by the producers at \$220,676; (b) 429,359 pounds of cobalt oxides, valued at \$611,909; (c) other cobalt compounds such as stellite and cobalt sulphate amounting to 60,437 pounds, valued at \$34,308; and (d) cobalt ores and residues exported amounting to 842 tons, valued at \$133,294; making a total valuation by the producers of \$900,187.

The 1918 production included: (a) 294,476 pounds of metallic cobalt, valued by the operators at \$713,072; (b) 476,053 pounds of cobalt oxides, valued at \$760,121; and (c) other cobalt compounds such as stellite and cobalt hydroxide amounting to 191,304 pounds, valued at \$936,139; making a total valuation of \$2,409,332.

The total cobalt ores and residues treated in 1919 were 9,084 tons with a cobalt content of 1,070,826 pounds, as against 8,354 tons with a cobalt content of 972,679 pounds in 1918.

No price quotations for cobalt are available for 1918 and 1919, but the metal as produced in the refineries of Ontario obtained a price of around \$2.50 per pound.

Summary of Cobalt Statistics.

		1916.	1917.	1918. (b).	1919.
Cobalt ores and residues treated.....	Tons.	8,127	7,770	8,354	9,084
Cobalt content of ores and residues treated...	Lbs.	1,254,953	866,327	972,679	1,070,826
Cobalt recovery from smelter products.....	Lbs.	840,536	1,079,572	737,157	530,371
Cobalt recovery from smelter products.....	Value.	\$924,590	\$1,727,315	\$1,842,893	\$1,325,928
Metallic cobalt produced.....	Lbs.	215,215	393,773	294,476	113,943
Metallic cobalt produced.....	Value.	\$200,888	\$616,633	\$713,072	\$220,676
Cobalt oxide produced.....	Lbs.	670,760	802,448	476,053	429,359
Cobalt oxide produced.....	Value.	\$542,341	\$1,104,500	\$760,121	\$611,909
Other cobalt compounds.....	Lbs.	128,008	214,785	191,304	60,437
Other cobalt compounds.....	Value.	\$267,819	\$740,032	\$936,139	\$34,308

(b) The record of cobalt production for 1918 as published in the Annual Report for that year have been revised because of duplication caused by the inclusion of materials re-treated.

COPPER.

The total production of copper in 1919 amounted to 37,526.8 tons, valued at \$14,028,265, as against 59,384.7 tons, valued at \$29,250,536 in 1918.

The production in 1919 included: 3,467 tons of refined copper; 11,583.5 tons contained in blister copper exported for refining; 12,098.7 tons contained in nickel-copper matte partly exported and partly refined in Canada; 20.7 tons contained in copper sulphate; and 10,356.8 tons, the estimated recoveries from ores exported for smelting and refining.

The 1918 production included: 3,808.7 tons of refined copper, 18,848.3 tons contained in blister copper; 23,482.3 tons contained in nickel-copper matte exported for refining; 22.1 tons contained in copper sulphate; and 13,223.2 tons, the estimated recoveries from ores exported for smelting and refining.

Refined copper was produced in Canada commercially for the first time in 1916 at the Trail refinery of the Consolidated Mining and Smelting Company.

British Columbia contributed 59.3 per cent of the total production for Canada in 1919, while Ontario produced 32.5 per cent, Quebec 3.6 per cent, Manitoba 4.4 per cent, and the Yukon 0.2 per cent.

The imports of copper in 1919 were valued at \$3,599,297 and included: crude and manufactured copper, 7,474.7 tons, valued at \$3,074,368; copper sulphate, 937.4 tons, valued at \$150,388; and manufactures of copper valued at \$374,541.

The imports in 1918 were valued at \$6,373,361 and included: crude and manufactured copper, 11,162 tons, valued at \$5,879,007; copper sulphate, 1,375.7 tons, valued at \$240,775; and manufactures of copper valued at \$253,579.

The imports of brass in 1919 were valued at \$3,964,339 and included: brass in crude and manufactured form 1,653.8 tons, valued at \$697,996 and containing approximately 1,157.6 tons of copper, and also manufactures of brass valued at \$3,266,343.

The imports of brass in 1918 were valued at \$4,647,872 and included: 1,994.3 tons of brass in crude and manufactured form, valued at \$993,574, and containing 1,396 tons of copper; and manufactures of brass valued at \$3,654,298.

The exports of copper in 1919 were valued at \$14,654,640 and included: copper in ore, matte, etc., 20,425.7 tons, valued at \$5,310,151; blister copper 9,978 tons, valued at \$3,747,355; copper, black or coarse, and in pigs, etc., 9,096.1 tons, valued at \$4,186,549; copper "old and scrap," 1,558.5 tons, valued at \$537,225; and copper wire and cable valued at \$867,360.

The exports of copper in 1918 were valued at \$20,772,109 and included: copper in ore, matte, etc., 36,698.2 tons, valued at \$9,221,681; copper, black or coarse, and in pigs, etc., 23,390.3 tons, valued at \$11,378,440; and "old and scrap," 447.7 tons, valued at \$171,988.

The price of copper fluctuated very much during 1919, but there was no real active market until towards the end of the year which closed with copper at 18½ cents per pound.

Summary of Copper Statistics.

	1916.	1917.	1918.	1919.
Ores and concentrates shipped (a)..... Tons.	2,587,929	1,878,911	1,856,899	1,085,950
Ores and concentrates shipped (a)..... Value.	\$19,989,448	\$16,048,186	\$11,658,397	\$9,265,569
Copper production..... Tons.	58,575	54,614	59,385	37,527
Copper production..... Value.	\$31,867,150	\$29,687,989	\$29,250,536	\$14,028,265
Production by provinces:—				
Quebec..... Lbs.	5,703,347	5,015,560	5,869,649	2,691,695
Ontario..... Lbs.	44,997,035	42,867,774	47,074,475	24,346,623
Manitoba..... Lbs.		(c) 1,152,960	2,339,751	3,348,000
British Columbia..... Lbs.	63,642,550	57,730,959	62,865,681	44,502,079
Yukon..... Lbs.	2,807,096	2,460,079	619,878	165,184
Imports of copper..... Tons.	13,699	16,549	12,538	8,412
Imports of copper (b)..... Value.	\$7,566,080	\$10,015,561	\$6,373,361	\$3,599,297
Exports of copper..... Tons.	66,610	59,961	60,536	41,058
Exports of copper..... Value.	\$22,642,699	\$23,256,278	\$20,772,109	\$14,654,640

(a) Does not include the nickel-copper ores. See nickel.

(b) Includes manufactures of copper for which no quantities are given; in 1916, \$234,421; in 1917, \$316,190; in 1918, \$253,579, and in 1919, \$374,541.

(c) Includes in 1917 small quantities from New Brunswick and Alberta.

GOLD.

The production of gold in 1919 amounted to 766,764 fine ounces, valued at \$15,850,423, and included: (a) alluvial gold, 104,495 ounces, or 13.6 per cent of the total; (b) gold obtained from the crushing of free-milling quartz ore, 529,296 ounces, or 69.1 per cent; (c) gold obtained from ores treated at the Canadian copper and lead smelters, 67,636 ounces, or 8.8 per cent; and (d) the estimated gold recoveries from ores exported, 65,337 ounces, or 8.5 per cent of the total production.

The production in 1918 amounted to 699,681 fine ounces, valued at \$14,463,689, and included: (a) alluvial gold, 16.7 per cent of the total; (b) gold from free-milling quartz, 63.1 per cent; (c) gold recovered in Canadian smelters, 12.1 per cent; and (d) the estimated recoveries from ores exported, 8.1 per cent.

There are two refineries producing fine gold in Canada, that of the Royal Mint at Ottawa, and that of the Consolidated Mining and Smelting Company of Canada, at Trail, B.C.

The production of gold by provinces is as follows: Nova Scotia, 0.1 per cent of the total; Quebec, 0.2 per cent; Ontario, 65.9 per cent; Manitoba, 0.1 per cent; British Columbia, 21.8 per cent, and the Yukon, 11.9 per cent.

The imports of gold in the form of fringe, and manufactures of gold and silver, were valued in 1919 at \$477,412. The Customs Department does not report any imports of gold bullion or gold coin after March 31, 1918. The imports in 1918 of gold in the form of bullion, coins, fringe and manufactures of gold and silver were valued at \$1,831,795.

The exports of gold in the form of dust, nuggets, etc., in 1919, were valued at \$5,037,123, as against \$10,040,813 in 1918. Much of the bullion formerly exported was marketed at the Royal Mint during 1919.

Summary of Gold Statistics.

		1916.	1917.	1918.	1919.
Gold ores and concentrates shipped.....	Tons.	9,340	8,874	15,112	5,229
Gold ores and concentrates shipped.....	Value.	\$522,409	\$365,375	\$411,090	\$298,222
Gold bullion shipped.....	Tons.	21	18	18	29
Gold bullion shipped.....	Value.	\$10,418,052	\$9,312,424	\$9,173,037	\$10,972,559
Gold production (a).....	Fine ounces.	930,492	738,831	699,681	766,764
Gold production.....	Value.	\$19,234,976	\$15,272,992	\$14,463,689	\$15,850,423
Production by provinces:—					
Nova Scotia.....	Ozs.	4,562	2,210	1,196	850
Quebec.....	Ozs.	1,034	1,511	1,939	1,470
Ontario.....	Ozs.	492,481	423,261	411,976	505,739
Manitoba.....	Ozs.	.....	440	1,926	724
Alberta.....	Ozs.	82	.....	27	24
British Columbia.....	Ozs.	219,633	133,742	180,163	167,252
Yukon.....	Ozs.	212,700	177,667	102,474	90,705
Imports of gold.....	Value.	\$20,938,634	\$14,601,931	\$1,831,795	\$477,412
Exports of gold.....	Value.	\$18,382,903	\$15,929,051	\$10,040,813	\$5,037,123

(a) Includes gold from copper ores and lead-zinc ores.

IRON AND STEEL.

Iron Ore.—The shipments of iron ore from Canadian mines were in 1919 the lowest that have been recorded in nineteen years and amounted to a total of 197,170 tons, valued at \$693,386, as compared with 211,608 tons, valued at \$885,893, shipped in 1918. The shipments in 1919 included 321 tons of titaniferous ore mined some years previously at Baie St. Paul, on the north shore of the St. Lawrence, several earloads from properties in Palmerston township, Frontenac county, and Bastard

township, Leeds county, Ontario; 1,200 tons of magnetite shipped from Dean channel, B.C., to Seattle, Wash., and the balance from the Moose Mountain magnetite mines and the Magpie siderite mine.

The Magpie siderite mine in the Michipicoten district of Ontario was operated throughout the year by the Algoma Steel Corporation, the siderite ore being roasted as usual in the rotary kiln plant at the mine. About 189,962 tons of roasted ore were produced and shipped to the blast furnace plant at Sault Ste. Marie. The raw ore averages about 34.3 per cent and the roasted ore about 50 per cent metallic iron.

Messrs. Moose Mountain, Limited, operating at Sellwood, Ont., were actively engaged throughout the year in the development of the milling and briquetting processes which are being employed in the treatment of these low grade magnetites. The raw ore averaged about 33.8 per cent iron, while the briquettes produced averaged about 63.8 per cent iron. Over 100,000 tons of raw ore were milled during the year, but only a comparatively small quantity, 5,483 short tons, of briquettes were marketed.

About 25 tons of magnetite were shipped by the British Columbia Department of Mines to Vancouver for an experiment in electric smelting by the Fleet process. In Bella Coola district several iron claims have been staked on Dean Channel by Filip Jacobson. About 1,200 tons were mined and shipped by the Smelters Steel Company of Seattle to an electric furnace plant which the company has erected near that point.

In the Great Lakes region ore prices from the 1st October, 1918, were: Old Range Bessemer, \$6.65 per gross ton (basis 55 per cent iron); Messabi Bessemer, \$6.40; Old Range Non-Bessemer, \$5.90 (basis 51.5 per cent iron); Messabi Non-Bessemer, \$5.75. From April 28, 1919, these prices were reduced by 20 cents per ton.

Of the total shipments in 1919 mine operators reported 7,083 tons as exported to the United States, and 190,087 tons shipped to Canadian blast furnaces. The Customs Department records show exports of iron ores to the United States during the year of 14,480 tons, valued at \$78,490, and imports of iron ore amounting to 1,783,098 tons, valued at \$4,706,440.

The quantity of iron ore charged to blast furnaces in 1919 was 1,752,585 tons, of which 78,391 tons were of domestic origin and 1,674,194 tons imported. The imported ore included 519,722 tons of Newfoundland ore and 1,154,472 tons of "Lake ore." Shipments of iron ore from Wabana Mines, Newfoundland, in 1919 by the two Canadian companies operating there were 499,972 short tons, as against 848,574 tons in 1918, all of which went to Sydney and North Sydney, in Cape Breton.

Pig-iron.—The total production of pig-iron in Canada in 1919, excluding the production of ferro-alloys, was 917,781 short tons (819,447 gross tons), having a value of \$24,577,589, as compared with a total production in 1918 of 1,195,551 short tons (1,067,456 gross tons), valued at \$33,495,171, showing a falling off of 277,770 tons, or 23 per cent. Of the 1919 total, 910,080 tons were made in blast furnaces and 7,701 tons were made in electric furnaces from scrap metal, chiefly shell turnings. In 1918 the blast furnace production was 1,163,510 tons and the electric furnace production from scrap steel was 32,031 tons.

The production of blast furnace pig-iron in Nova Scotia in 1919 was 285,087 tons, as against 415,870 tons in 1919, and with the exception of 1914 was the smallest production in that province since 1905. In Ontario the production of blast furnace pig-iron was 624,993 tons, as against 747,650 tons in 1918. Although less by 16 per cent than in the previous year, the 1919 production in Ontario was exceeded in only four previous years.

Less than one-quarter as much pig-iron was made from electric furnaces from scrap steel as in the previous year, the output being derived from six furnace plants in 1919 as compared with ten plants operated in 1918.

By grades the 1919 production included: Basic, 580,426 tons; Bessemer, 7,637 tons; foundry and malleable, etc., 322,017 tons; low phosphorus iron (electric furnace), 7,701 tons. The 1918 production included: Basic, 966,409 tons; Bessemer, 15,415 tons; foundry and malleable, etc., 181,696 tons; low phosphorus iron (electric furnace), 32,031 tons.

The blast furnace plants operated included those of the Dominion Iron and Steel Company at Sydney, N.S.; the Nova Scotia Steel and Coal Company at North Sydney; the Standard Iron Company at Deseronto, Ont.; the Steel Company of Canada at Hamilton, Ont.; the Canadian Furnace Company at Port Colborne, Ont.; the Algoma Steel Corporation, Limited, at Sault Ste. Marie, Ont.; the Midland Iron and Steel Company at Midland, Ont.; and the Parry Sound Iron Company, Limited, at Parry Sound, Ont.

Electric furnaces were operated for the production of pig-iron from scrap at Hull and Shawinigan Falls in Quebec, at Collingwood, Belleville and Welland in Ontario, and at Vancouver, British Columbia.

The production of ferro-alloys in Canada in 1919, including ferro-silicon, silico spiegel, spiegeleisen and ferro-phosphorus, all with the exception of the spiegeleisen being made in electric furnaces, was about 48,601 tons, valued at \$2,000,809. In 1918 the production was 44,704 tons, valued at \$4,731,521. Over one-half the tonnage made in 1919 was spiegeleisen made by the Algoma Steel Corporation for the company's own use.

The exports of pig-iron during 1919 were 63,605 tons, valued at \$1,820,260, or an average of \$28.62 per ton, and of ferro-alloys 22,449 tons, valued at \$1,229,341, or an average of \$54.76 per ton. The exports of pig-iron included 57,845 tons to the United States, 783 tons to Chili, 7 tons to Japan, and 4,970 tons to other countries. The ferro-alloys exports included 2,564 tons to United Kingdom, 15,371 tons to the United States, and 4,514 tons to other countries.

The imports during 1919 included 35,800 tons of pig-iron, valued at \$1,022,871, or an average of \$28.80 per ton, and 16,222 tons of ferro-alloys, valued at \$901,678, or an average of \$55.58 per ton, making a total import of pig-iron and ferro-alloys of 52,022 tons, valued at \$1,924,549. The United States trade records show exports to Canada during 1919 of pig-iron and ferro-alloys amounting to 33,751 gross tons (37,801 short tons), valued at \$1,052,103.

Steel.—The total production of steel ingots and direct steel castings in 1919 was 1,030,342 short tons (919,948 long tons), of which 993,039 tons were ingots and 37,303 tons direct steel castings.

The total production in 1918 was 1,873,708 short tons (1,672,946 long tons), of which 1,800,171 tons were ingots and 73,537 tons were castings.

The 1919 production included: open-hearth steel, 1,007,495 tons; electric steel, 15,502 tons; crucible and converter steels, 7,345 tons. The 1918 production included: open-hearth steel, 1,746,334 tons; electric steel, 119,130 tons; crucible and converter steels, 8,244 tons.

The total production of electric furnace steel in 1917 was 50,467 tons and in 1916, 19,639 tons.

The total production of pig-iron, ferro-alloys and steel in electric furnaces was about 41,683 tons in 1919, as compared with 191,869 tons in 1918, and 101,031 tons in 1917.

The exports of steel during 1919, as per Customs Department records, included billets, blooms and ingots, 28,087 tons, valued at \$1,731,529, or an average of \$61.65 per ton; bars and rods, 52,191 tons, valued at \$3,394,894, or an average of 65.05 per ton; steel rails, 30,737 tons, valued at \$1,297,836, or an average of \$42.22 per ton; wire and wire nails valued at \$5,745,773; structural steel, 5,515 tons, valued at \$465,989, or an average of \$84.49 per ton; scrap iron and steel, 245,214 tons, valued at \$3,779,179,

The total refined lead produced in Canada, including that produced from foreign ores and the pig-lead produced in Ontario smelters, amounted in 1919 to 17,165 tons, as against 15,786 tons in 1918.

The imports of lead, including the lead in pigments, salts, etc., in 1919 were 7,044 tons, valued at \$883,536, with also manufactures of lead valued at \$138,729.

The imports in 1918 were 7,853 tons, valued at \$1,240,247, besides manufactures of lead valued at \$110,442.

The exports of lead in ores, concentrates, etc., and as pig, amounted in 1919 to 12,235 tons, valued at \$1,389,012, as against 15,073 tons, valued at \$1,990,697, in 1918.

The average price of lead at Montreal, the main Canadian market, in 1919, was 6.966 cents per pound, as against 9.250 cents in 1918.

Summary of Lead Statistics.

	1916.	1917.	1918.	1919.
Number of men employed.....	1,643	1,914	1,691	1,615
Wages paid.....	\$1,803,633	\$2,295,090	\$1,980,351	\$1,884,338
Ores and concentrates shipped (a)..... Tons.	84,516	46,799	75,256	54,508
Ores and concentrates shipped (a)..... Value.	\$4,568,500	\$3,866,862	\$4,705,573	\$3,044,839
Lead production..... Tons.	20,749	16,288	25,699	21,914
Lead production..... Value.	\$3,532,692	\$3,628,020	\$4,754,315	\$3,053,037
Imports of lead..... Tons.	13,725	8,490	7,853	7,044
Imports of lead (b)..... Value.	\$2,077,896	\$1,732,428	\$1,350,689	\$1,022,265
Exports of lead, in ores, concentrates and as pig.. Tons.	4,580	7,208	15,073	12,235
Exports of lead, in ores, concentrates and as pig.. Value.	\$565,890	\$987,509	\$1,990,697	\$1,389,012

(a) Does not include zinc ore shipments—See "Zinc."

(b) Includes manufactures of lead for which no quantities are given; in 1916, \$124,833; in 1917, \$165,764; in 1918, \$110,442; and in 1919, \$138,729.

MERCURY.

There has been no production of mercury recorded since 1897, although the Kerr Lake Mines, Ltd., of Cobalt, Ont., in their report to shareholders mention a small recovery for 1918 and 1919.

The imports of mercury in 1919 were 26,465 pounds, valued at \$31,573, as against 56,936 pounds, valued at \$68,703, in 1918.

The average price of mercury in New York in 1919 was \$92.15 per flask of 75 pounds, as against \$123.47 in 1918.

MOLYBDENUM.

The total production in 1919 representing the quantity of molybdenite (MoS_2) contents of the concentrates shipped for which payment was made, amounted to 83,002 pounds, valued at \$69,203, as against 378,029 pounds, valued at \$434,733, in 1918.

The total shipments of concentrates were in 1919, 46 tons, valued at \$69,203, as against 461.3 tons, valued at \$428,807, in 1918.

All the ore produced was concentrated in Canadian mills which treated 6,783 tons in 1919, as against 33,935 tons in 1918.

The exports of molybdenite in 1919 as shown by customs records were 113,500 pounds, valued at \$84,226, or an average of 74 cents per pound, as against 351,600 pounds, valued at \$402,435, or an average of \$1.14 per pound, in 1918.

Summary of Molybdenum Statistics.

		1916.	1917.	1918.	1919.
Men employed.....	No.	262	501	119	105
Wages paid.....		\$122,072	\$260,692	\$274,945	\$35,536
Ore mined.....	Tons.	13,522	26,871	34,030	7,280
Ore treated.....	"	9,106	22,605	33,935	6,783
Ore or concentrates shipped.....	"	610	1,554	461	46
Ore or concentrates shipped.....	Value.	\$188,316	\$320,006	\$423,807	\$69,203
MoS ₂ contents of shipments paid for.....	Pounds.	156,461	288,705	378,029	83,002
MoS ₂ contents of shipments paid for.....	Value.	\$156,461	\$288,705	\$434,733	\$69,203
Exports of molybdenite.....	Pounds.	(a)	(b) 64,700	351,600	113,500
Exports of molybdenite.....	Value.	(a)	(b) \$81,173	\$402,435	\$84,226

(a) No figures available for 1916.

(b) Cover 9 months only.

NICKEL.

The production of nickel in 1919 amounted to 22,272.4 tons, valued at \$17,817,953, as against 46,253.6 tons, valued at \$37,002,917, in 1918.

The nickel production of Canada includes: The nickel in the matte produced from the treatment of the Ontario nickel-copper ores partly refined in Canada at Port Colborne, Ont., and partly exported for refining; the refined nickel and the estimated contents of the nickel oxides and nickel salts produced from the treatment of the silver-cobalt-nickel ores of Cobalt district.

The refined nickel produced in 1919 amounted to 5,064 tons, as against 1,504.5 tons in 1918. The large increase is due to the production of the new refinery at Port Colborne.

The imports of nickel in ingots, bars, sheets, etc., were in 1919, 195.5 tons, valued at \$135,959, besides manufactures of nickel valued at \$343,063, as against 319.1 tons, valued at \$238,895, and manufactures valued at \$204,208, in 1918.

The exports of nickel in ore and matte and of nickel fine in 1919 amounted to 20,508.2 tons, valued at \$8,077,593, as against 43,739.2 tons, valued at \$11,263,246, in 1918.

The price of refined nickel in New York was around 45 cents per pound throughout 1919.

Summary of Nickel Statistics.

		1916.	1917.	1918.	1919.
Number of men employed in nickel-copper mines.....		2,712	2,644	2,424	1,022
Wages paid in nickel-copper mines.....		\$2,824,818	\$2,981,896	\$3,186,909	\$1,244,713
Nickel-copper ore shipped.....	Tons.	1,566,333	1,509,841	1,641,617	572,400
Nickel-copper ore shipped.....	Value.	\$11,766,201	\$11,323,808	\$12,312,128	\$4,579,200
Nickel-copper ore smelted.....	Tons.	1,521,689	1,453,661	1,559,892	754,567
Bessemer matte produced.....	Tons.	80,011	78,897	87,184	42,736
Nickel contents of matte.....	Tons.	41,298	41,887	48,886	22,035
Copper contents of matte.....	Tons.	22,430	21,196	23,482	12,099
Refined nickel produced from nickel-copper matte.....	Tons.			1,082	4,865
Refined nickel produced from cobalt-nickel ores.....	Tons.	40	133	122	199
Total nickel production from all sources.....	Tons.	41,479	42,165	46,254	22,272
Total nickel production from all sources.....	Value.	\$29,035,497	\$33,732,112	\$37,002,917	\$17,817,953
Imports of nickel.....	Tons.	446	427	319	195
Imports of nickel (a).....	Value.	\$414,410	\$519,064	\$443,103	\$479,022
Exports of nickel in ore and matte, and nickel fine.....	Tons.	40,221	40,636	43,739	20,508
Exports of nickel in ore and matte, and nickel fine.....	Value.	\$8,662,179	\$8,708,650	\$11,263,246	\$8,077,593

(a) Includes manufactures of nickel for which no quantities are given: in 1916, \$89,083; in 1917, \$149,718 in 1918, \$204,208, and in 1919, \$343,063.

PLATINUM AND ALLIED METALS.

The most important sources of the metals of the platinum group in Canada are those of the nickel-copper ores, but no attempt to recover them in Canada has been made previous to 1919.

These metals have been recovered for several years past in the refineries in the United States and England. No data is available as to the recoveries in England and those reported in the United States are believed to be derived mostly from the treatment of the Canadian nickel-copper matte.

A small recovery is reported every year from the treatment of the alluvial sands of British Columbia.

The Royal Mint at Ottawa has also recovered a few ounces of platinum and palladium during the last few years from the treatment of the residues obtained in its refinery.

The Port Colborne refinery of the International Nickel Company of Canada reported for the first time in 1919 a production of metals of the platinum group in an impure state.

The production from alluvial sands in 1919 was 25 crude ounces of platinum, valued at \$2,150, as against 39 ounces, valued at \$2,560, in 1918.

The production at Port Colborne in 1919 was 87 crude ounces of platinum and palladium valued at \$4,981.

The recovery at the Ottawa Royal Mint in 1919 was: platinum, 114.474 ounces, valued at \$8,055.27, and palladium, 0.696 ounces, valued at \$87 (also 20.782 ounces of iridium from treatment of South African gold bullion); the recovery in 1918 was: platinum, 15.936 ounces, valued at \$1,455.66 (also 49.775 ounces of iridium from treatment of foreign bullion).

The total recovery of the metals of the platinum group at the New Jersey plant of the International Nickel Company, was 1,683 ounces, with an estimated value of \$214,000. Gold and silver were also recovered from this source as well as the metals of the platinum group.

The recovery of platinum alone was in 1919, 616.716 ounces, as against 649.737 ounces in 1918.

The imports of platinum in 1919 were valued at \$160,885, as against \$31,140 in 1918.

The exports of platinum in concentrates, etc., and as "old and scrap" in 1919 amounted to 671 ounces, valued at \$62,629, as against 197 ounces valued at \$20,892 in 1918.

Summary of Platinum Statistics.

		1916.	1917.	1918.	1919.
Platinum production from alluvial sands....	Ozs.	15	57	39	25
	Value.	\$600	\$3,823	\$2,560	\$2,150
Platinum recovered at the Ottawa Royal Mint	Ozs.	7½	18	16	23
	Value.	\$532	\$1,663	\$1,456	\$1,990
Platinum metals recovered in Canada from the treatment of Sudbury mattes, platinum and palladium.....	Ozs.				87
	Value.				\$4,981
Platinum metals recovered in United States* from treatment of Sudbury mattes:—					
Platinum.....	Ozs.	1,017	971	650	617
Palladium.....	Ozs.	1,345	1,354	787	762
Rhodium.....	Ozs.	257	325	473	227
Osmium, iridium and ruthenium.....	Ozs.				77
Imports of platinum as crucibles, wire, bars, etc.....	Value.	\$88,543	\$114,279	\$31,140	\$160,885
Exports of platinum in concentrates and "old scrap".....	Ozs.	532	331	197	671
Exports of platinum.....	Value.	\$41,945	\$29,599	\$20,892	\$62,629

*Other residues have occasionally been treated along with those derived from the Sudbury mattes but it is believed that the greater part of these recoveries may be credited to the Canadian source.

SILVER.

The silver production of Canada in 1919 amounted to 16,020,657 fine ounces valued at \$17,802,474, as against 21,383,979 fine ounces valued at \$20,693,704, in 1918, and included refined silver, or silver contained in silver and gold bullion, silver contained in blister copper and copper matte, and the silver estimated as recoverable from ores exported.

In 1919 Ontario produced 75.7 per cent of the total production; British Columbia, 23.1 per cent, and the balance of 2.2 per cent was derived from Quebec, Manitoba, and the Yukon.

The imports of silver in 1919 were: silver bullion valued at \$3,458,097, as against \$368,889 in 1918; and silver sterling and in coin valued at \$131,766, as against \$68,381 in 1918.

The exports of silver in 1919 were 15,405,161 fine ounces valued at \$16,410,797, as against 19,357,076 ounces valued at \$18,382,902 in 1918, and included silver as bullion and contained in ores, etc.

The average price of silver in 1919 was 111.122 cents per ounce, as against 96.772 cents in 1918.

Summary of Silver Statistics.

	1916.	1917.	1918.	1919.
Number of men employed in Cobalt district.....	2,595	2,448	2,187	2,017
Wages paid.....	\$2,450,614	\$2,667,607	\$2,918,474	\$2,556,767
Shipments from the mines of Cobalt and adjacent districts:—				
Ores and concentrates.....	Tons. 77,453	72,719	73,646	62,045
	Value. \$9,736,490	\$10,123,838	\$9,763,737	\$7,096,775
Silver bullion.....	Ozs. 4,982,702	9,248,717	6,675,863	4,293,887
	Value. \$3,444,736	\$7,628,740	\$6,821,528	\$4,868,543
Total silver production of Canada (a).....	Fine oz. 25,459,741	22,221,274	21,383,979	16,020,657
Total silver production of Canada.....	Value. \$16,717,121	\$18,091,895	\$20,693,704	\$17,802,474
Production by Provinces:—				
Quebec.....	Ozs. 98,610	136,194	178,675	140,926
Ontario.....	Ozs. 21,608,158	19,301,835	17,198,737	12,117,878
Manitoba.....	Ozs.	7,201	13,316	20,760
British Columbia.....	Ozs. 3,392,872	2,655,994	3,921,336	3,713,537
Yukon.....	Ozs. 360,101	119,605	71,915	27,556
Alberta and New Brunswick.....	Ozs.	445	.....	.....
Imports of silver, as bullion, sterling and coins.....	Value. \$998,966	\$1,063,418	\$437,270	\$3,589,863
Exports of silver, as bullion and in ores, etc. ...	Ozs. 25,279,359	21,718,784	19,357,076	15,405,161
	Value. \$15,637,885	\$17,621,398	\$18,382,902	\$16,410,797

(a) Includes silver from silver ores of Cobalt district, with also that derived from the treatment of the lead, zinc, gold, and copper ores.

TIN.

Tin ores have not yet been found in sufficient quantities in Canada to be of economic importance.

The imports of tin in 1919 were valued at \$3,367,900, as against \$4,204,532 in 1918, and included tin in blocks, pigs, etc., tin foil, bichloride of tin, tin ware and tin crystals.

There are also large imports of tin plates and sheets, the quantity in 1919 being 43,407 tons, valued at \$6,436,047, as against 72,844 tons, valued at \$11,403,887, in 1918.

TUNGSTEN.

There was no production of tungsten ore reported in 1919. The production in 1918 amounted to $13\frac{1}{2}$ tons, valued at \$11,700, with a metallic content of 19,915 pounds of WO_3 . In 1917 only small test shipments were made, amounting in all to 580 pounds, running 69.41 per cent WO_3 and netting \$234. Most of the 1918 production was from the property of Acadia Tungsten Mines, Ltd., operating at Burnt Hill, N.B.

The only important production previous to 1918 was that of 1912, being 14 tons of concentrates produced by the Scheelite Mines, Ltd., of Moose River, N.S.

ZINC.

The zinc production in Canada, including the actual recoveries of refined zinc at Trail, B.C., and the estimated recoveries from ores and concentrates shipped to American smelters amounted to 16,097.4 tons, valued at \$2,362,448, as against 17,541.6 tons, valued at \$2,862,436, in 1918.

The total shipments of zinc ores and concentrates from the mines were in 1919, 135,535 tons, valued at \$1,049,493, and containing 59,959,709 pounds of zinc, as against 121,200 tons valued at \$1,228,195 and containing 64,655,713 pounds in 1918.

The refined zinc which is produced at Trail, B.C., amounted in 1919 to 12,326 tons, as against 12,574 tons in 1918, 9,985 tons in 1917, and 2,974 tons in 1916, the first year production was reported.

The imports of zinc in 1919 amounted to 11,903 tons, valued at \$1,822,376, with also manufactures valued at \$43,155, as against 15,654.6 tons, valued at \$2,718,850, with also manufactures valued at \$85,177, in 1918.

The imports of brass which alloy contains about 30 per cent zinc, were valued in 1919 at \$697,996, besides manufactures of brass, valued at \$3,266,343, as against imports of brass valued at \$993,574 and manufactures of brass valued at \$3,654,298 in 1918.

The exports in 1919 were: zinc ores, 6,630 tons, valued at \$296,212; and metallic zinc, 3,847 tons, valued at \$701,249; while in 1918 the exports are given as ores only and amounted to 10,545 tons, valued at \$476,791.

The average price of spelter in New York in 1919 was 7.338 cents per pound, as against 8.159 cents in 1918.

Summary of Zinc Statistics.

		1916.	1917.	1918.	1919.
Ores and concentrates shipped.....	{ Tons.	82,077	116,489	121,200	135,535
	{ Value.	\$1,086,249	\$1,323,985	\$1,228,195	\$1,049,493
Zinc production.....	{ Tons.	11,682	14,834	17,542	16,097
	{ Value.	\$2,991,623	\$2,640,817	\$2,862,436	\$2,362,448
Refined zinc product.....	{ Tons.	2,974	9,985	12,574	12,326
Imports of zinc.....	{ Tons.	15,000	18,566	15,655	11,903
	{ Value.	\$3,690,577	\$3,641,272	\$2,804,027	\$1,865,531
Imports of brass.....	{ Value.	\$923,523	\$1,277,249	\$993,574	\$697,996
Exports of brass manufactures.....	{ Value.	\$3,752,851	\$4,051,410	\$3,654,298	\$3,266,343
Exports of zinc ore.....	{ Tons.	(b)	(c) 5,972	10,545	6,630
	{ Value.	(b)	\$320,296	\$476,791	\$296,212
Exports of metallic zinc.....	{ Tons.	(d)	(d)	(d)	3,847
	{ Value.	(d)	(d)	(d)	\$701,249

(a) Includes manufactures of zinc valued at \$21,711 in 1915; at \$48,101 in 1916; at \$79,044 in 1917; at \$85,177 in 1918, and at \$43,155 in 1919.

(b) Not separately classified previous to April, 1918.

(c) For nine months only.

(d) Previous to 1919 not separately classified.

NON-METALLIC PRODUCTS.

ABRASIVE MATERIALS.

Corundum.—There were no sales of grain corundum reported in 1919 from Canadian corundum ores.

Twenty-six tons of grain corundum were recovered in 1919 from 1,300 tons of rock or old mill tailings treated. In the earlier days of the industry from 6 to 10 per cent of the rock milled was recovered in the form of grain corundum. During recent years a much lower grade of rock has been milled.

Corundum is found in an area embracing several townships in Renfrew and Hastings counties, in the province of Ontario. The industry made its appearance there in 1900, the production reaching a maximum in 1906. From 1907 to 1913 the yearly production was smaller, but fairly uniform. Operations were indefinitely suspended during August, 1918, but were renewed again in 1919, when the old Craig mine was reopened in June by Corundum, Limited, of Craigmont, Ont. The principal work done was in rebuilding and construction.

Production.

(In Short Tons.)

Calendar Year.	Corundum-bearing rock treated.	Grain corundum graded.	% Recovery	Grain Corundum.				Average price, cents per pound.
				Sold in Canada.	Exported.	Total.	Total value.	
1915.....	1,724	116	6.7	21	240	262	\$33,138	6.33
1916.....	1,864	67	3.6	8	59	67	10,307	7.65
1917.....	4,659	188	4.0	16	172	188	32,153	8.55
1918.....	3,184	137	4.3	0	137	137	26,112	9.9
1919.....	1,300	26	2.0	0	0	0	0	

Grindstones, Pulpstones, etc.—The total production of grindstones, pulpstones, and scythestones in 1919 was 2,020 tons, valued at \$60,516, as against a production in 1918 of 3,072 tons, valued at \$83,005.

The production of abrasives has been a long-established industry in Nova Scotia and New Brunswick and in so far as output is concerned has remained practically stationary for many years.

The grindstones are shipped chiefly in a finished condition and are marketed in Canada, Newfoundland, and the United States, the prices ranging in 1919 from \$30 to \$50 per ton.

A number of pulpstones are usually made each year. Scythestones, both finished and in the rough, are also shipped, as well as occasionally small quantities of grit for marble polishing.

The greater proportion of the Canadian production of grindstones is exported. The value of the finished grindstones so exported during 1919 was \$33,682.

To meet Canadian requirements, in Ontario and Quebec chiefly, there were imported during 1919 grindstones to the value of \$281,066; burrstones, 1,106, valued

at \$3,421; emery, \$38,106; manufactures of emery, \$316,322; pumice stone, \$29,910; sandpaper, \$362,069; iron sand for glass, or polishing, or for sawing stone, \$10,247; artificial abrasives, valued at \$82,866, or a total value of \$1,124,007.

	1916.		1917.		1918.		1919.	
	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
		\$		\$		\$		\$
Production—								
Nova Scotia..... Tons.	273	5,800	375	9,875	256	8,000	283	9,000
New Brunswick... “	3,205	46,982	2,148	35,879	2,816	75,005	1,737	51,516
	3,478	52,782	2,523	45,754	3,072	83,005	2,020	60,516
Exports of grindstones (a).....		44,942		31,304		47,148		38,682
Exports—Abrasive.								
Artificial.....								(m) 465,228
Artificial, crude.....						2,028,839		(n) 1,040,132
Artificial, for wheels, etc.								(n) 14,858
Natural, n.o.p. cwt.							8,529	10,743
Imports—Abrasive								
Grindstones.....		122,291		185,607		297,287		281,066
(b) Burrstones..... No.	406	648	519	910	733	1,571	1,106	3,421
(c) Emery.....		50,666		79,176		89,020		38,106
(d) Mfgs. emery.....		317,053		553,660		570,892		316,322
(e) Pumice stone.....		34,554		34,162		36,938		29,910
(f) Iron sand.....		15,641		36,737		67,528		10,247
(g) Sand paper.....		247,317		331,776		317,048		362,069
Artificial abrasives.....		79,315		112,614		134,328		82,866
		867,485		1,334,642		1,514,612		1,124,007

(a) Including stone for the manufacture of grindstones. (b) Burrstones in blocks, rough or unmanufactured, not bound up or prepared by binding into millstone. (c) Emery in bulk, crushed or ground, duty free. (d) Emery and carborundum wheels and manufactures of emery or carborundum. (e) Pumice and pumice stone, ground or unground. Duty free. (f) Iron sand or globules for polishing glass or granite, or for sawing stone. Duty free. (g) Sandpaper, glass, flint, and emery paper or emery cloth. (m) 1st three months. (n) last nine months.

Tripolite (diatomaceous or infusorial earth).—The shipments of tripolite in 1919 were reported as 565 tons, valued at \$11,300, as compared with shipments in 1918 of 500 tons, valued at \$12,500.

The shipments from year to year have varied considerably and in some seasons the producing companies shipped from stock only, as was the case in 1919.

Since 1902 Nova Scotia has been the only province from which shipments of tripolite have been made. At the present time the principal operator is the Oxford Tripoli Company, operating in Colchester county. The crude product is dried and treated in a small mill.

A brief review of the uses of tripolite, together with a list of the principal known Canadian occurrences, was published in the Annual Report on Mineral Production for 1914.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production.....	620	12,139	600	18,000	500	12,500	565	11,300

ACTINOLITE.

No mining operations were carried on during 1919; shipments from stock were reported as 80 tons, valued at \$880—the value of the material after having been milled and prepared for market.

Production of actinolite in Canada has been confined to Elzevir and Kaladar townships, in Hastings and Addington counties, province of Ontario, the centre of the industry being Actinolite. The earliest operations date back to about 1883. For a time deposits were worked only at intervals long apart, when sufficient rock was broken to meet the demand for several subsequent years.

Actinolite is used as an ingredient for a coal-tar roofing compound, the grinding of the crude material being done in such a way so as not to destroy the fibre.

The only shipper in recent years is the Actinolite Mining Company, of Bloomfield, New Jersey, U.S.A., which owns the deposits noted, and also a grinding mill at Actinolite.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production.....	250	\$ 2,750	120	\$ 1,320	228	\$ 2,508	80	\$ 880

ARSENIC.

The demand for arsenic has been particularly strong. The Canadian production includes arsenious oxide refined and crude produced in the smelting of the arsenical silver-cobalt-nickel ores of the Cobalt district; in addition to which arsenic has been recovered at Tacoma, Wash., from the arsenical gold concentrates shipped from the Hedley gold mine at Hedley, B.C.

The total production in 1919 was 2,859 tons of arsenious oxide and approximately 530 tons of arsenic in concentrates, having a total valuation of \$509,924. The production in 1918 was 2,482 tons of arsenious oxide and approximately 1,078 tons of arsenic in concentrates, having a total valuation of \$563,639.

The exports of white arsenic in 1919 were 2,506 tons, valued at \$355,654. The imports of white arsenic were 4,706 pounds, valued at \$1,325; imports of sulphide of arsenic, 304,694 pounds, valued at \$26,613; and imports of arseniate, bi-arseniate, and stannate of soda, 5,566 pounds, valued at \$1,661.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production:—		\$		\$		\$		\$
From arsenical concentrates.....			280	11,200	1,078	43,114	530	21,218
White arsenic.....	2,186	262,340	2,656	658,231	2,482	520,525	2,859	488,706
	2,186	262,340	2,936	669,431	3,560	563,639	3,389	509,924
Exports: White arsenic.....	1,975	197,458	4,286	507,898	2,672	393,883	2,506	355,654
Imports:	Pounds.		Pounds.		Pounds.		Pounds.	
White arsenic.....	41,090	7,086	247,610	32,083	995	222	4,706	1,325
Sulphide of arsenic.....	239,991	11,839	252,848	22,053	301,985	33,351	304,694	26,613
Arseniate of soda.....	15,779	1,228	4,469	588	121	34	5,566	1,661

ASBESTOS.

As usual the production has all been derived from Black Lake, Thetford, Robertsonville, Coleraine, East Broughton and Danville, in the Eastern Townships, province of Quebec.

There was a falling off in 1919 in the output but an increase in the sales of crude asbestos. The shipments of mill stock were slightly less than in 1919.

The total value of the shipments of asbestos and asbestic in 1919 was \$10,975,369, as against \$8,970,797 in 1918.

The average number of men employed in mining was 2,060 and in milling 1,507, or a total of 3,567, and the total wages paid were \$3,954,407. The tonnage of rock mined and quarried was 3,082,384 and the tonnage milled 2,636,783.

Exports of asbestos during 1919 were 119,122 tons, valued at \$9,625,695, or an average of \$80.81 per ton, and of asbestic sand and waste, 25,306 tons, valued at \$260,775, or an average of \$10.30 per ton. There was also an export of manufactures of asbestos valued at \$232,501. In 1919 there were 10,500 tons, valued at \$942,796, exported to Great Britain; 95,176 tons, valued at \$7,232,744, to United States; 2,932 tons, valued at \$413,580, to France; 1,529 tons, valued at \$245,210, to Italy; 8,985 tons, valued at \$791,365, to other countries.

The imports of asbestos and manufactures of asbestos in 1919 were valued at \$656,037.

Output, Sales, and Stocks of Asbestos.

	Output.	Sales.			Stocks on hand December 31		
	Tons.	Tons.	Value.	Per ton.	Tons.	Value.	Per ton.
1918.			\$	\$		\$	\$
Crude.....	4,313	3,692	2,478,363	671.28	1,686	1,109,402	658.00
Mill stock.....	139,143	137,770	6,458,441	46.88	12,560	941,612	74.97
	143,456	141,462	8,936,804	63.17	14,246	2,051,014	143.97
Asbestic....		16,797	33,993	2.02			
1919.							
Crude.....	4,065	3,928	3,214,022	818.23	1,338	974,260	728.14
Mill stock.....	153,507	132,837	7,695,430	57.93	31,110	1,952,629	62.76
	157,572	136,765	10,909,452	79.77	32,448	2,926,889	90.20
Asbestic.....		22,471	65,917	2.93			

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Rock mined.....	2,291,132		2,635,010		2,462,381		3,082,384	
" milled.....	1,822,461		2,260,191		2,185,572		2,636,783	
Output—								
Milled.....	112,832		135,475		139,143		153,507	
Crude.....	5,415		6,268		4,313		4,065	
	118,247		141,743		143,456		157,572	
Mill recovery %...	6.2		6.0		6.4		5.8	
Sales—								
Asbestos.....	133,439	5,199,797	135,502	7,183,099	141,462	8,936,804	136,765	10,909,452
Asbestic.....	20,710	29,072	18,279	47,284	16,797	33,993	22,471	65,917
	154,149	5,228,869	153,781	7,230,383	158,259	8,970,797	159,236	10,975,369
Exports—								
Asbestos.....	96,775	3,872,463	93,932	4,903,326	119,454	7,786,710	119,122	9,625,695
Sand and waste.	33,564	241,272	52,088	430,956	22,144	228,059	25,306	260,775
Manufactures....		4,741		55,666		40,763		232,501
		4,118,476		5,389,948		8,055,532		10,118,971
Imports—		334,670		537,431		604,703		656,037

BARYTES.

Shipments of ground barytes in 1919 were 468 tons, valued at \$8,154, as compared with 640 tons, valued at \$10,165, in 1918.

During recent years the only barytes deposit worked in Canada has been that at Lake Ainslie, Inverness county, N.S. In the province of Ontario, however, a deposit located in Langmuir township, south of Porcupine, has been under development during the past few years by the Premier Langmuir Mines, Ltd.

Imports of barytes are not separately shown in the Trade classification. The imports of barium peroxide for the manufacture of hydrogen peroxide amounted to 52 tons, valued at \$23,788, in 1919, as compared with 53 tons, valued at \$27,893, in 1918. There is also a small import of artificial sulphate of barium known as blanc fixé, the imports being included with satin white. These imports in 1919 were 3,718 tons, valued at \$114,732.

Blanc fixé (barium sulphate) is artificially prepared by treating a solution of barium salt, generally the chloride with sulphuric acid, or aluminium sulphate. It is used for coating papers.

Satin white is an artificially prepared mineral for coating paper, consisting of precipitated calcium sulphate and alumina, prepared by grinding together the necessary proportions of alum and slaked lime with sufficient water.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production—								
Nova Scotia.....	1,368	19,393	3,490	54,027	580	9,145	468	8,154
Ontario.....					60	1,020		
Imports—								
Barium peroxide.....	57	26,172	73	17,393	53	27,893	52	23,788
Blanc fixé and satin white.....	3,747	86,306	3,600	90,482	3,528	92,241	3,718	114,732

CHROMITE.

The total shipments in 1919 of ores and concentrates, all from the Eastern Townships, Quebec, were 8,541 short tons, valued at \$228,898, or an average of \$26.80 per ton, the total content of Cr_2O_3 , being 3,764 tons.

The 1919 shipments included: Crude ore, 3,376 short tons, valued at \$69,894, or an average of \$20.70 per ton and with an average Cr_2O_3 content of 35.3 per cent; concentrates, 5,165 short tons, valued at \$159,004, or an average of \$30.78 per ton, and with an average Cr_2O_3 content of 49.8 per cent. The crude ore shipped included 371 tons sold for consumption in Canada and 3,005 tons sold for export. The concentrates with the exception of about 2 tons were sold for export.

The exports of chromite in 1919 as per Trade reports were 9,078 tons, valued at \$198,733, or an average of \$21.89 per ton, as compared with exports in 1918 of 15,831 tons, valued at \$353,616, or an average of \$22.32 per ton.

Ferro-chrome has been imported into Canada, but there is no separate record of the quantities thereof. The imports of bichromate of soda in 1919 were 1,003,836 pounds, valued at \$113,478; and imports of bichromate of potash 58,072 pounds, valued at \$19,525.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production (shipments)—		\$		\$		\$		\$
Crude ore.....	14,249	266,217	20,153	441,540	15,605	456,408	3,376	69,894
Concentrates.....	1,000	44,685	3,558	140,256	6,389	410,714	5,165	159,004
	a15,249	310,902	a23,711	581,796	21,994	867,122	8,541	228,898
Shipments by Provinces—								
Quebec.....	27,517	311,460	36,725	499,682	21,324	835,727	8,541	228,898
Br. Columbia.....					670	31,395		
Exports.....	12,633	152,534	19,229	342,528	15,831	353,616	9,078	198,733
Imports—								
Bichromate of soda.....	711	362,571	667	248,621	523	208,669	502	113,478
“ potash.....	15.5	13,381	10.1	6,697	10.4	10,686	29	19,525

a Shipments as reported directly by operators in 1916 were 27,517 tons, valued at \$311,460; and in 1917, 36,725 tons valued at \$499,682.

COAL AND COKE.

Coal.—The total production of marketable coal during 1919 (comprising sales, colliery consumption, and coal used in making coke, or used otherwise by colliery operators) was 13,681,218 short tons, valued at \$54,413,349, or an average of \$3.98 per ton.

The production in 1918 was 14,977,926 short tons, valued at \$55,192,896, compared with which the 1919 production shows a decrease of 1,296,708 tons, or 8.66 per cent in quantity and \$779,547, or 1.41 per cent in total value.

The total output of coal including waste and unmarketable slack in 1919 was 14,080,655 tons, as against 15,460,385 tons in 1918.

The 1919 production included 111,324 tons of anthracite, all from one mine in Alberta; 10,642,902 tons of bituminous coal and 2,926,992 tons of lignite.

Every province, with the exception of Saskatchewan, shows a decrease. The Nova Scotia production fell off 98,189 tons, as compared with 1918; New Brunswick, 89,104 tons; Saskatchewan increased by 33,322 tons; Alberta decreased 1,008,281 tons; British Columbia decreased 132,656 tons; and Yukon decreased 1,800 tons.

Output¹ and Production² of Coal by Provinces, 1919.

Province.	Average No. of men employed	Wages Paid.	Production of Coal.				Output. Short tons.
			Short tons.	Per cent of total.	Value.	Average per ton.	
		\$		p.c.	\$	\$	
Nova Scotia.....	10,978	13,970,149	5,720,373	41.81	22,078,726	3.86	5,804,674
New Brunswick.....	565	503,268	179,108	1.31	794,761	4.42	178,438
Saskatchewan.....	487	467,436	380,169	2.78	820,522	2.16	384,117
Alberta.....	9,343	11,414,755	4,964,535	36.29	18,294,495	3.69	5,004,268
British Columbia.....	5,813	8,465,255	2,435,933	17.80	12,420,445	5.10	2,707,958
Yukon Territory.....	12	5,500	1,100	0.01	4,400	4.00	1,200
Total.....	27,198	34,826,363	13,681,218	100.00	54,413,349	3.98	14,080,655

¹ Output includes waste and unmarketable slack. ² Production includes sales, colliery consumption and coal used by operators in making coke, or for other uses.

Monthly Production of Coal in Canada by Provinces, 1919, (in short tons).

Month.	Nova Scotia.	New Brunswick.	Saskatchewan.	Alberta.			British Columbia.	Total.
	(b)	(b)	(c)	(a)	(b)	(c)	(b)	
January.....	501,536	21,788	28,034	12,730	282,908	204,410	240,200	1,291,606
February.....	405,112	16,262	23,937	11,645	265,431	147,545	185,072	1,055,004
March.....	420,460	14,529	26,164	13,414	278,377	210,994	212,646	1,176,584
April.....	454,398	13,339	16,001	13,679	214,830	96,615	185,444	994,306
May.....	451,127	12,011	18,588	76	169,549	95,439	182,661	929,451
June.....	433,890	13,627	20,337	39	4,328	37,794	127,710	637,725
July.....	467,042	14,249	20,971	750	7,226	55,826	154,859	721,283
August.....	484,437	15,691	26,900	2,611	33,006	117,630	168,660	*850,435
September.....	489,369	13,821	35,327	12,278	208,657	286,584	213,780	1,260,156
October.....	569,790	17,376	48,153	14,673	279,096	390,475	252,794	1,572,357
November.....	508,957	16,026	55,367	13,907	284,578	433,345	256,413	1,568,593
December.....	534,255	10,389	60,390	15,522	278,402	470,166	255,694	1,624,818
Total.....	5,720,373	179,108	380,169	111,324	2,306,388	2,546,823	2,435,933	*13,681,218

* Includes 1,100 tons produced in the Yukon district. (a) Anthracite; (b) bituminous; (c) lignite.

	1916.		1917.		1918.		1919.	
	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.
Output.....	14,815,703	\$	14,435,361	\$	15,460,385	\$	14,080,655	\$
Production: by provinces—								
Nova Scotia.....	6,912,140	18,514,662	6,327,091	19,410,737	5,818,562	21,095,470	5,720,373	22,078,726
N. Brunswick.....	143,540	386,016	189,095	708,010	268,212	1,331,710	179,108	794,761
Saskatchewan.....	281,300	441,836	355,445	662,451	346,847	722,148	380,169	820,522
Alberta.....	4,559,054	11,386,577	4,736,368	14,153,685	5,972,816	20,537,287	4,964,535	18,294,495
B. Columbia.....	2,584,061	8,075,190	2,433,888	8,235,716	2,568,589	11,494,681	2,435,933	12,420,445
Yukon.....	3,300	13,200	4,872	29,232	2,900	11,600	1,100	4,400
	14,483,395	38,817,481	14,046,759	43,199,831	14,977,926	55,192,896	13,681,218	54,413,349
Production: by kinds—								
Anthracite.....	12,212,071	33,121,789	108,225	35,359,920	115,405	44,967,894	111,324	44,357,443
Bituminous.....			11,154,251		11,636,190		10,642,902	
Lignite.....	2,271,324	5,695,692	2,784,283	7,839,911	3,226,331	10,225,002	2,926,992	10,055,906
Imports—								
Bituminous ¹	9,504,552	12,368,679	12,407,486	33,712,894	13,656,360	37,291,057	10,127,965	24,750,717
Bituminous ²	3,505,236	3,704,624	3,129,776	8,739,877	3,237,067	8,351,639	2,228,197	4,814,388
Anthracite.....	4,570,815	22,216,363	5,320,198	28,109,586	4,785,160	26,007,888	4,952,675	31,595,694
	17,580,603	38,289,666	20,857,460	70,562,357	21,678,587	71,650,584	17,308,837	61,160,799
Exports—								
The produce of Canada.....	2,135,359	7,099,387	1,733,156	7,387,192	1,817,195	9,405,423	2,070,050	12,438,885
All other.....	62,783	150,799	47,328	173,176	67,486	205,389	56,988	157,202
Consumption.....	29,865,856	69,856,961	33,123,735	106,201,820	34,771,832	117,232,668	28,863,017	102,978,061

¹ Round and run-of-mine. ² Slack such as will not pass through $\frac{3}{4}$ " screen.

Coke.—The accompanying statistics cover only the production of coke in by-product and Beehive coke oven plants and do not include retort coke recovered by gas companies.

Both domestic and imported coal are used in the manufacture of coke in Canadian coke-oven plants.

The total output during 1919 was 1,160,470 short tons made from 1,880,541 tons of coal, of which 854,835 tons were of domestic origin and 1,025,706 tons imported. The output thus averaged 0.617 ton of coke per ton of coal charged. The total coke used, or sold by producers during the year was 1,133,680 tons, valued at \$9,720,387, or an average of \$8.58 per ton.

By provinces the output was: Nova Scotia, 394,744 tons; Ontario, 667,081 tons; and British Columbia, 98,645 tons.

The ovens operated during the year were those at Sydney, and Sydney Mines, N.S.; Sault Ste. Marie, and Hamilton, Ont.; and Fernie, Michel, Union Bay, and Anyox, B.C.

At the close of the year 587 ovens were in operation.

The exports of coke in 1919 were 14,709 tons, valued at \$129,703, or an average of \$8.82 per ton, as against exports in 1918 of 29,612 tons, valued at \$223,629, or an average of \$7.55 per ton. The imports of coke in 1919 were 383,374 tons, valued at \$2,405,740, or an average of \$6.27 per ton, as against imports in 1918 of 1,165,590 tons, valued at \$8,975,445, or an average of \$7.70 per ton.

The estimated consumption of oven coke in 1919 was 1,502,345 tons, as compared with 2,386,722 tons in 1918.

Of the total output of coke 1,036,229 tons, or 89 per cent were made in by-product recovery ovens and the recovery of by-products included: Ammonium sulphate, 11,765 tons, and tar, 12,394,249 gallons, as against 10,825 tons of ammonium sulphate and 8,009,327 gallons of tar in 1918.

	1916.		1917.		1918.		1919.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Coal charged.—								
Domestic.....	1,501,835	\$	1,379,038	\$	1,348,232	\$	854,835	\$
Imported.....	633,076		549,885		635,010		1,025,706	
Total.....	2,134,911		1,928,923		1,983,242		1,880,541	
Output: coke.....	1,448,782		1,231,865		1,258,284		1,160,470	
Recovery.....	67.9		63.9		63.4		61.7	
Production—								
Nova Scotia.....	654,433	2,617,732	643,757	3,218,735	580,433	5,966,609	383,253	3,939,906
Ontario.....	472,507	2,008,155	389,048	2,155,326	425,087	3,300,127	649,506	4,886,662
Alberta.....	41,950	167,800	31,649	181,982	32,564	213,884	565	3,602
Br. Columbia.....	300,851	1,255,725	181,408	1,106,488	212,570	1,554,575	100,356	890,217
Total.....	1,469,741	6,049,412	1,245,862	6,662,581	1,250,744	11,035,195	1,133,680	9,720,387
Exports.....	48,539	221,334	23,595	137,318	29,612	223,629	14,709	129,703
Imports.....	757,116	2,229,078	970,106	6,517,260	1,165,590	8,975,445	383,374	2,405,740
Consumption.....	2,178,318	8,057,156	2,192,373	13,042,523	2,386,722	19,787,011	1,502,345	11,996,424
By-products—								
Ammonium Sulphate—								
Production.....	11,040		9,941		10,825		11,765	
Imports.....	119.5	9,672	283.5	26,062	4.2	1,273	101.7	12,129
Exports (a).....			8,047	693,377	8,696	1,027,558	18,438	1,821,880
Tar—								
Production.....	9,012,202		8,277,078		8,009,327		12,394,249	
Exports.....		50,352		43,547		67,646 (b)	836,210	61,654
Tar, coal and pine—								
Imports.....	2,111,017	108,193	2,388,331	146,962	2,579,273	192,569	2,988,280	193,011
Tar, coal, base or salt (parantranline)—								
Imports.....	114,467	76,093	81,978	61,103	96,458	63,803	60,463	43,205
Gas.....	5,058,636		3,963,826		4,699,009		8,538,210	
Ovens in operation Dec. 31.....	1,807		1,637		1,640		587	

(a) Not separately shown previous to April, 1917. (b) Quantity for 9 mos.

FELDSPAR.

The shipments of feldspar in 1919 were 14,679 tons, valued at \$86,231, or an average of \$5.87 per ton, as compared with shipments in 1918 of 18,782 tons, valued at \$112,728, or an average of \$6 per ton.

The greater part of the feldspar shipped from Canadian mines is marketed with the pottery manufacturers in the United States. The production comes chiefly from the counties of Frontenac and Lanark in Ontario and the counties of Ottawa and Labelle in Quebec.

The exports of feldspar during the year were valued at \$104,285.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production (shipments)—								
Quebec.....	4,610	18,075	1,188	8,204	191	4,279	925	13,073
Ontario.....	14,878	53,332	18,274	81,622	18,591	108,449	13,754	73,158
	19,488	71,407	19,462	89,826	18,782	112,728	14,679	86,231
Exports (a).....				69,195		101,187	.....	(b) 104,285

(a) Not separately stated prior to April, 1917.

(b) Last 9 months' exports were 15,469 tons valued

at \$77,270.

FLUORSPAR.

The production of fluorspar shows a substantial decrease. The smaller production from Madoc, Ont., was supplemented by increased shipments from the recently opened deposit in Yale district of British Columbia.

The total shipments during 1919 were 5,063 tons, valued at \$97,837, as compared with 7,362 tons, valued at \$156,029, in 1918.

Only three companies in the Madoc district reported shipments during the year at an average value of \$17.31, as compared with an average of \$20.97 in 1918. Prices varied with the grade of the product from \$16 to \$27 per ton.

The Consolidated Mining and Smelting Company is operating the "Rock Candy" fluorspar deposit on Kennedy Creek, Kettle river, near Grand Forks, B.C. The company reports very favourable indications for a large tonnage in excess of their own requirements, for export.

Canadian steel companies use from 10,000 tons to 15,000 tons per annum.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production—								
Ontario.....	1,284	10,238	4,249	68,756	7,187	150,779	3,425	59,281
British Columbia.....					175	5,250	1,638	38,556
	1,284	10,238	4,249	68,756	7,362	156,029	5,063	97,837
Exports (9 months).....							697	9,616
Imports—								
Hydro-fluo-silicic acid.....	448.2	28,611	0.2	97	0.5	80	2.8	747

GRAPHITE.

The production of graphite in 1919 showed a considerable falling off. The total shipments included 1,340 tons, valued at \$99,821, from Ontario, and a small shipment of 20 tons, valued at \$400, from Quebec.

By grades the shipments included 95 tons of No. 1 flake, valued at \$22,100, or an average of \$232.63 per ton; 103 tons of No. 2 flake, valued at \$14,853, or an average of \$144.20 per ton; and 1,162 tons of No. 3, and dusts, valued at \$63,268, or an average of \$54.45 per ton.

In 1918, Ontario contributed 2,934 tons, valued at \$208,852, and Quebec and Baffin Land, 180 tons, valued at \$40,018.

The quantity of ore milled during the year was 7,076 tons, from which were produced 1,648 tons of milled, or refined graphite.

The total quantity of ore milled during 1918 was 11,358 tons, from which were produced 3,225 tons of refined, or milled graphite. The Black Donald (Calabogie, Ont.) ore consists largely of amorphous graphite, from which a large mill recovery is made.

Graphite operators reported that of the total shipments 1,317 tons, valued at \$95,357, were sold for export. Trade records show exports of graphite or plumbago, crude and refined, 1,003 tons, valued at \$72,917, and manufactures of plumbago (probably chiefly refined graphite), valued at \$23,970, a total export of \$96,887. The Customs export classification was revised as from April 1, 1919, the class "plumbago, crude and concentrates" being replaced by "graphite, or plumbago, crude and refined."

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Ore milled.....	23,199	\$	19,614	\$	11,358	\$	7,076	\$
Output, milled graphite....	4,133		4,003		3,225		1,648	
Production (shipments)—								
No. 1 Flake.....			540	158,656	366	97,518	95	22,100
No. 2 Flake.....			650	99,621	73	13,780	103	14,853
No. 3 Flake and dust....			2,524	144,615	2,675	137,572	1,162	63,268
	3,955	325,362	3,714	402,892	3,114	248,870	1,360	100,221
Exports—								
Crude ore and concen-								
trates.....	311	13,114	112	7,455	664	32,710		
Crude and refined.....							1,003	72,917
Manufactures (a).....		304,919		384,505		205,993	(b) 23,970	
Imports—								
Plumbago, not ground...		3,231		47,218		93,956		6,604
Ground and manufac-								
tures.....		99,919		123,991		132,821		80,970
Crucibles: clay, or plum-								
bago.....		520,341		798,044		113,856		59,239
		624,491		969,253		340,633		146,813

(a) The entries under this item are believed to be chiefly refined graphite.

(b) First three months only. No entries under this class during the last nine months of the year.

Artificial Graphite.—Artificial graphite is manufactured in electric furnaces at Niagara Falls, Ont., by the International Acheson Graphite Company. The annual production has been as follows:—

Calendar Year.	Pounds.	Calendar Year.	Pounds.	Calendar Year.	Pounds.
1906.....	445,047	1911.....	2,172,098	1916.....	525,048
1907.....	407,779	1912.....	2,302,625	1917.....	1,096,172
1908.....	428,540	1913.....	2,184,472	1918.....	1,808,698
1909.....	513,436	1914.....	1,234,239	1919.....	358,524
1910.....	2,442,166	1915.....	497,271		

GYPSUM.

The total quantity of gypsum rock quarried in 1919 was 303,998 tons, of which 121,496 tons were calcined. The shipments of all grades totalled 299,063 tons, valued at \$1,215,287, and included: lump gypsum, 172,781 tons, valued at \$206,858; crushed, 27,939 tons, valued at \$68,002; fine ground, 3,842 tons, valued at \$18,901, and calcined, 94,501 tons, valued at \$921,526. By provinces the shipments were: Nova Scotia, 163,852 tons, valued at \$250,174; New Brunswick, 42,409 tons, valued at \$315,656; Ontario, 59,899 tons, valued at \$278,120; Manitoba, 32,903 tons, valued at \$371,337.

The average number of men employed in 1919 was 725 and wages paid \$380,105, as compared with 435 men employed and \$275,312 paid in wages in 1918.

Exports of crude gypsum were 148,394 tons, valued at \$199,857, and of gypsum ground valued at \$140,235.

The imports of gypsum of all grades during 1919 were valued at \$47,455 and included: crude gypsum, 1,238 tons, valued at \$22,556; ground gypsum, 85 tons, valued at \$2,695, and plaster of Paris, 1,525 tons valued at \$22,204.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Ore, mined.....	424,431		365,659		155,298		303,998	
Ore, calcined.....	94,414		97,667		88,748		121,496	
Production—								
Lump.....	249,893	263,050	223,760	246,774	43,728	47,727	172,781	206,858
Crushed.....	15,680	28,111	32,305	51,869	25,074	55,079	27,939	68,002
Fine ground.....	6,096	19,673	4,843	19,222	4,558	12,621	3,842	18,901
Calcined.....	71,246	427,759	75,424	564,119	78,927	707,579	94,501	921,526
	342,915	738,593	336,332	881,984	152,287	823,006	299,063	1,215,287
Production by Provinces—								
Nova Scotia.....	238,212	278,160	215,472	301,261	49,365	115,976	163,852	250,174
New Brunswick.....	39,546	153,064	38,556	191,631	27,225	214,114	42,409	315,656
Ontario.....	36,668	116,086	48,947	130,138	38,214	151,564	59,899	278,120
Manitoba.....	28,489	191,283	32,347	258,934	37,483	341,352	32,903	371,337
British Columbia.....			10	20				
Exports—								
Crude.....	221,156	252,476	224,426	245,182	67,824	80,843	148,394	199,857
Ground.....		154,630		146,384		101,618		140,235
		407,106		391,566		182,461		340,092
Imports—								
Crude.....	3,022	14,358	64	999	112	2,015	1,238	22,556
Ground.....	282	3,404	282	5,355	79	1,836	85	2,695
Plaster of Paris.....	3,786	25,529	3,101	29,106	1,095	18,214	1,525	22,204
	7,090	43,291	3,447	35,460	1,286	22,065	2,848	47,455

MAGNESITE.

The production of magnesite obtained from the deposits in Argenteuil county, Quebec, is marketed as crude magnesite, calcined, and dead burnt clinker (the latter being sintered in rotary kilns after mixture with about 5 per cent of iron ore in the form of magnetite). The total shipments in 1919 were 11,273 tons, valued at \$328,465, as compared with shipments in 1918 of 39,365 tons, valued at \$1,016,765.

There were marketed about 1,638 tons of crude magnesite, valued at \$14,664, averaging about \$8.95 per ton. Calcined material sold at from \$20 to \$22 per ton and dead burnt clinker averaged \$35 per ton.

In 1919 about 14,952 tons of magnesite rock were quarried and about 12,214 tons were calcined in lime kilns, or sintered in rotary cement kilns. The sintering was done at the plants of the Canada Cement Company at Hull and Montreal.

Exports of magnesite in 1919 were valued at \$425,892. During the last nine months this included 5,638 tons, valued at \$170,797.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Crude magnesite mined.....	57,300	\$	64,767	\$	57,799	\$	14,952	\$
Crude magnesite calcined.....	4,666		11,401		49,303		12,214	
Production—								
Crude magnesite {	53,080	491,947	52,711	528,260	16,697	158,380	1,638	14,664
Calcined and dead burnt.... {	2,333	71,882	5,379	200,015	22,668	858,385	9,635	313,801
(b) 55,413	563,829	58,090	728,275	39,365	1,016,765	11,273	328,465	
Exports (a).....				72,228		816,553		425,892
Imports, magnesite	195	20,651	58	16,186	47	13,200	183	61,740

(a) Not separately shown prior to April, 1917.

(b) Includes shipments of 635 tons valued at \$9,525 from Atlin, B.C.

Metallic Magnesium.—The manufacture in Canada of metallic magnesium was carried on for a few years during the war by the Shawinigan Electro Metals Company, Limited, at Shawinigan Falls, Que., the metal being made from imported magnesium chloride salts.

Magnesium Sulphate.—Sulphate of magnesium, epsomite, or crude Epsom salt has been found in several localities in southern British Columbia.

Commercial shipments were made during the past few years from a deposit near Kruger mountain, Osoyoos division, B.C., where the mineral is found in a flat depression known as Spotted lake, which is a partially dried-up lake containing alternate circles of water and dry places. The Stewart-Calvert Company, Inc., of Oroville, Washington, has been operating this deposit. The crude magnesium sulphate salt is hauled to the company's works at Oroville, where the crude salt is refined and prepared for the market. Shipments in 1916 were reported as 250 tons, and in 1915 about 300 tons. In addition to the Spotted Lake deposit the same company also made shipments during 1918 from a deposit near Clinton, in Lillooet, B.C.

Several lakes containing these salts have been observed on the Basque ranch, near Ashcroft. Following investigations of their probable commercial value shipments were made in 1919 by the Basque Chemical Production Company, Limited.

The greater part of the refined salt is used for industrial purposes, the tanning industry taking the largest proportion, though considerable amounts are also used in the textile industries and in the manufacture of dyes. About 20 per cent of the total shipments go to the drug trade.

	1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.
Quantity extracted.....	2,600	\$	4,500	\$		
Quantity shipped.....	929	4,645	1,949	14,565	738	9,115
Exports.....						15

MANGANESE ORE.

The production of manganese ore in Canada has been small and irregular. During 1919 operations were renewed at New Ross, in Nova Scotia, and shipments again reported from Kaslo, B.C. The bulk of the reported shipments for the year were, however, made from the Hill 60 group of claims near the village of Cowichan Lake, Vancouver island.

The manganese ores which have been mined in eastern Canada are pyrolusite, manganite, psilomelane, and bog manganese. These were mostly ores with a high manganese content, and fairly free from deleterious constituents. The largest part of the production was consequently put to those uses, where a high grade raw material is desired, e.g., as an oxidizing agent in the manufacture of chlorine, bromine, manganates, and permanganates; as a decolorizer of glass, porcelain, and enamels; as a colouring material in dyeing and pottery and paint manufacture; as a drier in paints and varnishes, and in the manufacture of dry and Leclanche cells, etc.

The first shipments of manganese ore from British Columbia were made in 1918 from deposits near Kaslo. These consist mainly of wad or bog manganese.

At the Cowichan Lake deposits, Vancouver island, "Manganese ore¹ of merchantable value is found as a mixture of secondary oxides, principally pyrolusite, psilomelane, and magnetite, derived from the alteration of rhodonite, the silicate of manganese, which occurs in strong outcrops throughout the manganiferous area. On Hill 60 claim oxidation of the silicate has taken place on a considerably larger scale than on some of the other claims, resulting in outcrops of hard and massive oxides containing from 15 to 57 per cent metallic manganese."

Shipments from both these deposits have been made to the Bilrowe Alloys Company of Tacoma, Wash., U.S.A.

No separate record of imports of manganese ore is kept in the Trade classification but statistics of oxide of manganese are given. In 1919 these imports were 2,082 tons, valued at \$89,314. Imports of ferro-silicon, spiegeleisen and ferro-manganese in 1919 were 16,221 tons, valued at \$901,678. The exports of manganese ore in 1919 were 603 tons, valued at \$13,401.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production—								
Nova Scotia.....	646	70,371	158	14,836			45	3,600
New Brunswick.....	311	19,173						
British Columbia.....					440	6,230	616	10,559
	957	89,544	158	14,836	440	6,230	661	14,159
Imports—								
Manganese oxide.....	1,170	63,786	1,769	92,616	1,068	93,477	2,082	89,314
Ferro-silicon, spiegeleisen and ferro-manganese....	14,777	1,879,538	12,828	2,029,990	35,284	4,283,133	16,221	901,678
Exports—								
Manganese ore	957	89,544	185	16,031	784	29,208	603	13,401
Ferro-silicon and compounds	22,802	1,352,013	33,212	2,616,924	23,781	2,671,434	22,449	1,229,341

¹ Report of Munitions Resources Commission, 1920, p. 90.

MICA.

The total shipments of mica by mine operators in 1919 were 2,754 tons, valued at \$273,788. By provinces the production was: from Quebec, 2,429 tons, valued at \$218,437 (of this 2,158 tons, valued at \$52,728, was rough-culled and scrap); Ontario, 325 tons, valued at \$55,351, or an average of \$170.31 per ton.

The statistics as to the value of production should be considered with due regard to the conditions under which the industry is conducted. The condition in which mica is shipped from the mines varies greatly; one operator may ship his output cleaned and trimmed, while the output of another is in a rough cobbled state, with consequent noteworthy difference in prices realized. And, further, companies operating trimming shops as well as mines may place only a nominal value on shipments from mines to trimming shops.

Canada's production of mica has come exclusively from two fields: one in the province of Quebec, a short distance north of the city of Ottawa, and the other embracing parts of the counties of Lanark, Leeds, and Frontenac, in the province of Ontario. The city of Ottawa (and the adjacent city of Hull), lying between these two fields, is the centre to which almost all the production of the various mines and numerous small prospects is shipped for trimming, grading, and marketing. In preparation for the market a considerable proportion of the tonnage received is cobbled out and the mica split, trimmed and otherwise manufactured, with the result that the exports, though of smaller tonnage than the shipments from the mines, usually exceed them in total value.

According to Trade records the exports of mica in 1919 were 2,741 tons, valued at \$641,962.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production:—								
Quebec	844	192,343	774	286,730	481	229,119	2,429	218,437
Ontario	364	62,896	392	72,121	266	42,431	325	55,351
	1,208	255,239	1,166	358,851	747	271,550	2,754	273,788
Exports	654	379,720	636	451,345	433	410,000	(a) 100	100,942
Cobbled							(b) 108	214,227
Splittings							(b) 350	314,238
Scrap and waste							(b) 2,182	11,959
Plate and manufactures							(b)	596

(a) First 3 months.

(b) Last 9 months.

MINERAL PIGMENTS (IRON OXIDES).

For many years there has been an annual production in the province of Quebec of iron oxide from deposits situated between Champlain and Three Rivers, a short distance from the St. Lawrence river.

These oxides are marketed after calcining, as paint materials, and are also sold crude for use in the purification of illuminating gas. The mineral paint is calcined, washed, and fine ground before shipment.

There was a small production included in the totals for 1917 and 1919 of zinc oxide for use as a pigment, the production being obtained at the oxide plant of the Canadian Zinc Products Company, Limited, at Notre-Dame-des-Anges.

The total production of iron oxides in 1919 was 11,862 tons, valued at \$113,427.

The exports of mineral pigments, iron oxides, ochres, etc., in 1919 are reported as 767 tons, valued at \$25,229.

Imports of mineral pigments are included under two classifications: (1) ochres and ochrey earths, siennas and umbers, duty 20 per cent, and (2) oxides, roughstuffs, fillers, fireproofs and colours, dry, n.e.s., duty 25 per cent. During 1919 imports under the first classification were 1,297 tons, valued at \$65,744, and under the second classification 3,378 tons, valued at \$518,780, or a total import of 4,675 tons, valued at \$584,524.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production.....	8,811	\$ 58,711	9,409	\$ 87,605	17,317	\$ 112,440	11,862	\$ 113,427
Imports—								
Ochrey earths.....	2,082	51,771	1,956	59,864	1,560	66,011	1,297	65,744
Oxides.....	2,917	357,487	2,538	357,638	2,460	409,841	3,378	518,780
Exports: (a).....	1,696	25,312	1,451	30,052	769	18,377	767	25,229

(a) Mineral pigments, iron oxides and ochres.

MINERAL WATER.

The statistics of production given herewith represent as usual, as closely as can be ascertained, the value of mineral water shipped from mineral springs in bottles, barrels, or other containers, and do not include any estimate of the value of mineral water used at springs for drinking or bathing purposes; nor are the natural pure spring waters included, of which a considerable quantity is sold in bottled form.

The value of the production in 1919 was \$71,015, as compared with \$154,468 in 1918; of the 1919 production, Quebec is credited with \$13,257; Ontario, \$55,958; and British Columbia, \$1,800.

The imports of mineral and aerated waters during the calendar year 1919 were valued at \$113,743, being 1,026 gallons of natural mineral water, valued at \$430; and aerated water valued at \$113,313. The exports of mineral water during the same year were valued at \$59,669, of which 122 gallons, valued at \$89, were for natural mineral water and \$59,580 for bottled aerated water.

	1916.		1917.		1918.		1919.	
		Value.		Value.		Value.		Value.
Production.....		\$ 127,806		\$ 145,814		\$ 154,468		\$ 71,015
Imports.....		130,933		108,444		105,967		113,743
Exports.....		1,598		10,765		20,214		59,669

NATURAL GAS.

The total production of natural gas in Canada in 1919 was 19,937,769 thousand cubic feet, valued at \$4,176,037, of which Ontario contributed 11,024,041 thousand cubic feet, valued at \$2,690,400; Alberta, 8,230,838 thousand cubic feet, valued at \$1,365,127; and New Brunswick, 682,890 thousand cubic feet, valued at \$120,510.

The value of the gas, as reported by producers, varies from 5 cents to 30 cents per thousand feet, but these prices do not represent what the consumer has to pay.

In some cases the producer also owns the distribution pipe line and receives the full price paid by the consumer. In other cases the producer may sell to a pipe line company who either sells directly to consumers, or may in turn resell to other pipe line companies for retail distribution; in such cases as these the producer receives only a fraction of the amount paid by the consumer, but he is saved the expense of distribution. The statistics given herewith represent, as far as possible, the value received by the producer, or owner, of the gas well, whether such producer be the owner of the distribution line or not.

Natural Gas Production, 1916-17-18.

	1916.		1917.		1918.	
	M cu. ft.	Value.	M cu. ft.	Value.	M cu. ft.	Value.
		\$		\$		\$
Production—						
New Brunswick.....	610,118	79,628	796,775	103,735	792,396	107,842
Ontario.....	17,953,109	2,765,105	19,838,035	3,641,587	13,029,524	2,884,460
Alberta.....	6,904,231	1,113,296	6,744,130	1,299,976	6,318,389	1,358,633
	25,467,458	3,958,029	27,408,940	5,045,298	20,140,309	4,350,940

Natural Gas Production, 1919.

Province.	No. of operators.	No. Men.	Wages.	Wells, 1919.						Production.		
				(a)	(b)	(c)	(d)	(e)	(f)	M cu. ft.	Value.	Average.
			\$								\$	\$
Manitoba.....	1			1				1		Small		
Quebec.....			6					* 6				
New Brunswick.....	1	22	39,001	22	1	1		23		682,890	120,510	0.176
Ontario.....	79	499	442,892	1902	74	22	122	1894	13	11,024,041	2,690,400	0.244
Saskatchewan.....			1					1				
Alberta.....	18	160	149,674	66	1	2	2	67	8	8,230,838	1,365,127	0.166
Total.....	99	681	631,567	1998	76	25	124	1991	22	19,937,769	4,176,037	0.209

(a) Total number of productive wells at beginning of year.

(b) Number of productive wells drilled during year.

(c) Number of dry wells drilled during year.

(d) Number of wells abandoned during year.

(e) Number of productive wells at end of year.

(f) Number of wells on which drilling was in progress at end of year.

*Idle.

PEAT.

During the year two bogs were operated, one at Garneau, Que., and the other at Alfred, Ont. About 2,500 tons were manufactured, while shipments were reported as 986 tons, valued at \$6,561.

These were the first shipments of peat since 1916. During the latter year about 300 tons, valued at \$1,500, were shipped from a bog in Middlesex county, Ontario. In 1915 shipments were made from the Alfred bog, Prescott county, amounting to 300 tons, valued at \$1,500.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production.....	300	1,500					986	6,561

PETROLEUM.

A bounty of $1\frac{1}{2}$ cents per gallon is paid on the marketed production of crude oil from Canadian oil-fields, the administration of the "Petroleum Bounty Act" being under the Department of Trade and Commerce. According to the bounty record the production in 1919 in Ontario was 219,804 barrels (7,693,141 imperial gallons), which at the average price per barrel of \$2.845 was worth \$625,342. The New Brunswick production was 4,225 barrels, worth about \$13,141, or an average value of \$3.11. For five years there has been a small but growing production of crude petroleum in Alberta, the greater part of which, however, does not earn the bounty because of its lightness, or low specific gravity. The approximate production in 1919 was 16,437 barrels, valued at \$97,841.

The total production in Canada from all sources was therefore 240,466 barrels (8,416,310 imperial gallons), valued at \$736,324.

The price of crude oil at Petrolia was quoted at \$2.78 on July 10, 1918, to September 8, 1919. Prices on this date were advanced ten cents per barrel and were in force to November 21, when they further advanced to \$3.13 per barrel. On December 22, they were increased to \$3.38 per barrel, remaining at this price to the end of the year. The average monthly price was, therefore, \$2.845, as compared with \$2.69 $\frac{1}{2}$ in 1918, \$2.33 $\frac{1}{4}$ in 1917, and \$1.98 in 1916.

The production (in barrels) of the various fields in the province of Ontario, as kindly furnished by the Supervisor of Petroleum Bounties at Petrolia, was as follows: Petrolia and Enniskillen, 70,087; Oil Springs, 45,245; Moore township, 4,029; Sarnia township, 4,259; Plympton township, 560; Bothwell, 29,425; Tilbury 18,365; Dutton, 1,272; Onondaga, 197; Mosa township, 45,860; Thamesville 801.

The production in New Brunswick is all obtained in the Stoney Creek district, Albert county. The Alberta production was obtained from six wells situated in the Turner Valley field, near Black Diamond, and about 35 miles southwest of Calgary.

In 1919 ten oil refineries in Canada used 299,986,199 gallons of crude oil, of which 292,281,146 gallons were imported, and 7,705,053 gallons were obtained from Canadian wells. The production of refined oils and petroleum products included: Gasoline and motor oils, 87,248,413 gallons; benzoline, benzene, and other light oils, 4,516,783 gallons; illuminating oils, 55,360,322 gallons; lubricating oils, 16,113,694 gallons; gas and fuel oils and tar, 95,216,183 gallons; wax and candles, 11,271,993 pounds; petroleum coke 113,514,982 pounds. There was also a production of asphalt and other products amounting to \$901,029. The total value of the products of refineries was \$42,856,074.

According to inspection returns of the Inland Revenue Department the total quantity of illuminating oils inspected during the calendar year 1919 was 63,480,214 gallons, and the quantity of naphtha or gasoline and other light oils was 97,519,950 gallons.

Exports of petroleum entered as crude mineral oil in 1919 were 603,748 gallons, valued at \$40,648, and of refined oil 2,846,293 gallons, valued at \$287,170. There was also an export of naphtha or gasoline of 1,566,707 gallons, valued at \$428,754.

The total value of the imports of petroleum and petroleum products in 1919 was \$29,560,023, as against a value of \$30,749,570 in 1918.

The total quantity of petroleum oils, crude and refined, imported in 1919 was 451,261,646 gallons, as compared with 420,728,933 gallons in 1918. A detailed record will be found in the accompanying tables.

Oil Wells and Oil Shipments, 1919.

Province.	Men Em- ployed.	Wages paid.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Oil Shipped (h)		
										Barrels.	Value.	Average value.
		\$								\$	\$	
New Brunswick.....	*	*	7	1	1	1	6	30	4,225	13,141	3.11	
Ontario (not complete)..	263	201,915	3,827	38	11	216	3,659	30	219,804	625,342	2.85	
Alberta.....	11	9,021	7	3	1	1	6	13	16,437	97,841	5.95	
Br. Columbia.....				3	1	1	5					
Total.....	274	210,936	3,841	42	1	12	218	3,671	48	240,466	736,324	3.06

*Included with natural gas statistics.

(a) Number of productive wells at beginning of year.

(b) Number of oil wells drilled during year.

(c) Number of gas wells drilled during year.

(d) Number of dry wells drilled during year.

(e) Number of wells abandoned during year.

(f) Total number of productive wells at end of year.

(g) Number of wells on which drilling was still in progress at end of year.

(h) Record of oil shipments for New Brunswick and Ontario based on bounty payments.

Petroleum.

	1916.		1917.		1918.		1919.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Bounty paid.....		\$ 104,014		\$ 107,799		\$ 153,958		\$ 119,714
Production, crude—								
New Brunswick.....		2,663	2,341	5,460	3,009	7,402	4,225	13,141
Ontario.....	1,845	389,621	202,991	473,477	288,692	777,737	219,804	625,342
Alberta.....	small		8,500	63,302	13,940	100,004	16,437	97,841
Production, refinery—	198,123	392,284	213,832	542,239	304,741	885,143	240,466	736,324
Refined oils.....			173,235,606	23,575,358	232,469,829	35,372,773	258,455,395	40,484,222
Other products (n).....				1,561,785		1,915,088		2,371,852
Refined oils inspected*—				25,137,143		37,287,861		42,856,074
Petroleum.....	34,155,473		41,366,586		55,443,056		63,480,214	
Naphtha.....	38,249,129		59,892,046		74,310,352		97,519,950	
Exports—	72,404,602		101,258,632		129,753,408		161,000,164	
Coal and kerosene, crude.....	137,647	11,439	2,130	183	270,302	28,415	603,748	40,648
Coal and kerosene, refined.....	446,595	48,137	28,212	6,558	1,946,967	206,675	2,846,293	287,170
Gasoline and naphtha.....	54,806	14,194	24,304	7,419	91,229	28,778	1,566,707	428,754
Imports—	639,048	73,770	54,646	14,100	2,308,498	263,868	5,016,748	756,572
(a) Crude (1) for refining.....	252,895,361	8,448,778	183,105,102	8,411,730	229,010,561	13,359,636	305,748,960	15,104,287
Crude (2) all other.....			142,524,473	5,958,930	148,537,043	8,355,387	99,559,068	4,702,771
(b) Crude gas oils.....	197,909	11,044	854,778	65,404	65,845	7,584	155,145	23,866
(c) Coal and kerosene, distilled.....	7,912,419	474,442	13,258,815	978,366	5,241,881	526,606	6,757,159	926,822
(d) Illuminating.....	167,688	68,451	198,281	115,194	205,839	152,825	156,126	119,565
(e) Lubricating.....	4,239,675	597,733	3,438,430	559,605	2,450,588	476,641	1,436,809	289,442
Lubricating, n.o.p.....	1,226,401	375,520	1,877,381	650,325	2,849,031	1,203,130	3,480,183	1,467,593
Gasoline.....	18,321,891	3,624,931	15,369,172	3,293,760	3,121,952	798,387	4,391,607	1,142,855
(f) Products, n.o.p.....	7,464,777	1,093,577	18,521,574	2,708,395	29,246,143	5,595,425	29,516,589	5,615,622
	292,426,121	14,604,476	379,148,006	22,741,709	420,728,933	30,475,621	451,261,646	29,392,823

Petroleum—Concluded.

	1916.		1917.		1918.		1919.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Paraffin wax..... Lbs.	1,061,112	\$ 70,308	1,620,634	\$ 140,722	1,755,422	\$ 209,916	844,838	\$ 108,049
Paraffin wax, candles..... "	220,264	30,539	513,337	75,257	327,657	64,033	297,419	59,151
	1,281,376	100,847	2,133,971	215,979	2,083,079	273,949	1,142,257	167,200

(a) (1) Crude petroleum in its natural state .7900 specific gravity or heavier at 60 degrees temperature, when imported by oil refineries to be refined in their own factories. (2) Petroleum (not including crude petroleum imported to be refined, or illuminating or lubricating oils) .8235 specific gravity or heavier at 60 degrees temperature.

(b) Crude petroleum, gas oils (other than benzene, naphtha and gasoline.)

(c) Coal and kerosene, distilled, purified, or refined.

(d) Illuminating oils composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon.

(e) Lubricating oils composed wholly or in part of petroleum, costing less than 25 cents per gallon.

(f) Products of petroleum, n.o.p.

(g) Including wax, candles, and asphalt. In 1919, this included petroleum coke also. (See table following).

* Department of Inland Revenue returns.

Production by Oil Refineries.

		1918.		1919.	
		Quantity.	Value.	Quantity.	Value.
Number of men employed, wages.....		2,934	\$ 3,439,394	4,082	\$
Crude oil receipts—					
Canadian.....	Gal.	12,258,190	918,332	8,179,865	752,161
Imported.....	"	250,382,965	22,789,768	303,557,828	24,497,369
		262,641,155	23,708,100	311,737,693	25,249,530
Materials used—					
Crude oil, Canadian.....	Gal.	10,039,645		7,705,053	
Crude oil, imported.....	"	250,170,254		292,281,146	
Sulphuric acid.....	Lb.	37,866,316		52,010,125	
Soda and alkali.....	"	2,179,620		2,440,732	
Litharge.....	"	97,319		87,195	
Sulphur.....	"	52,302		32,303	
Other material.....	"	382,672		392,976	
Output—					
Gasoline and motor oils.....	Gal.	72,175,768	19,249,169	87,248,413	23,162,889
Benzoline, benzene and other petrol spirits..	"	1,530,592	384,927	4,516,783	883,194
Illuminating.....	"	65,268,598	7,130,517	55,360,322	8,301,042
Lubricating.....	"	14,402,523	2,571,691	16,113,694	3,174,318
Fuel and gas oils, tar.....	"	79,092,347	6,036,469	95,216,183	4,962,779
Wax and candles.....	Lb.	13,759,972	1,148,727	11,271,993	1,044,798
Other solids.....			766,361		(a) 1,327,054
Total.....			37,287,891		42,856,074
Crude equivalent of stocks on hand Dec. 31.....	Gals.	75,102,150		68,883,671	

(a) In 1919 includes 113,514,982 pounds petroleum coke valued at \$426,025.

PHOSPHATE.

The small production of phosphate, or apatite, which has been obtained in Canada since 1896 has been produced almost altogether as a by-product in connection with the mining of mica. Shipments during 1919 totalled 24 tons, valued at \$331.

Phosphate is used at Buckingham, Que., in the manufacture of phosphorus and ferro-phosphorus, and the main supply of ore is obtained from Florida.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Production—		\$		\$		\$		\$
Quebec.....	190	2,340	123	1,230	140	1,200	22	300
Ontario.....	13	174	26	256			2	31
	203	2,514	149	1,486	140	1,200	24	331
Exports-Phosphate rock...	103	1,543	14	200			48	741
Imports—								
Phosphate rock (fertilizer).....		16,182		62,543		90,363		30,267
Acid phosphate (a).....	1,376	146,910	1,440	209,298	1,558	302,424	1,423	295,387
Phosphorus.....	48	42,738	36	34,519	37	35,125	24	19,928
Phosphor, tin and bronze		26,426		50,709		46,554	62	61,647
Manufactured fertilizers.....		639,884		1,045,140		670,364		651,832
Superphosphate (b).....								178,292

(a) Probably refined phosphate of lime and phosphate of soda.

(b) Separately classified as from April 1, 1919; formerly included under manufactured fertilizers.

PYRITES.

The shipments of pyrites as sulphur ore from Canadian mines were considerably smaller than in the previous year. The total shipments were 176,487 tons, valued at \$522,704, and included 52,746 tons, valued at \$203,222, from the province of Quebec; 117,011 tons, valued at \$285,832, from the province of Ontario; and 6,730 tons, valued at \$33,650, from the province of British Columbia. The total sulphur content of shipments was 65,674 tons, or an average of 37.2 per cent.

The principal shipments were obtained from the same sources as in the previous year with only half the tonnage. In Quebec, cupriferous ores were shipped from the Eustis and Weedon mines, in the Eastern Townships. In Ontario the largest shippers for export were the mines at Goudreau, on the Algoma Central railway, in Michipicoten district, and at North Pines, on the Canadian National railway, northwest of Port Arthur. Mines shipping for domestic consumption were the Helen, in Michipicoten, the Sulphide, the Queensboro, and the Clyde Lake. In British Columbia shipments were made from the Sullivan mine at Kimberley to the sulphuric acid plant at Trail, and from Anyox to the acid plant at Barnet, B.C.

Customs records show exports of pyrites during 1919 as 89,089 tons, valued at \$388,508. These figures are much less than those reported directly by the operators, and it is possible that some of the exports from Quebec may be entered as a copper ore. The imports of brimstone, or sulphur in roll or flour were 56,062 tons, valued at \$1,015,223.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production—								
Quebec.....	130,639	523,272	122,882	501,351	124,871	507,802	52,746	203,222
Ontario.....	177,552	555,523	288,058	1,080,866	268,507	1,133,963	117,011	285,832
British Columbia.....	1,060	5,300	5,709	28,545	18,238	63,454	6,730	33,650
	309,251	1,084,095	416,649	1,610,762	411,616	1,705,219	176,487	522,704
Sulphur content.....	116,975	.....	155,453	.....	154,269	.....	65,674	.....
Exports.....	156,722	557,024	279,646	974,200	240,453	949,067	89,089	388,508
Imports—								
Brimstone or sulphur in roll or flour.....	73,467	1,186,618	82,445	1,515,309	92,062	2,058,811	56,062	1,015,223

Sulphuric Acid.—Sulphuric acid is manufactured in different grades or strengths, and in recording statistics of production it is desirable for purposes of comparison that the quantities of the several grades should be reduced as far as possible to a uniform standard.

Production records have been obtained in terms of the standard grades 50° Bé., 60° Bé., 66° Bé., and stronger acids. The quantities of the first two grades have, however, in the following statistics been reduced to their equivalent in 66° Bé., acid.

The total production of sulphuric acid in Canada during the twelve months ending December 31, 1919, derived from seven producing plants expressed in terms of 66° Bé. acid was 63,596 short tons. The production during the first six months of 1919 was 30,030 tons and during the last six months of the year 33,566 tons.

The ores used in the manufacture of sulphuric acid in 1919 included 2,245 tons of imported sulphur, or brimstone, and 54,879 tons of pyrites, chiefly from Canadian mines but including 1,266 tons imported.

The production during the first six months of 1920 was 38,891 tons from seven plants, the quantity of imported sulphur used being 4,848 tons, and of Canadian pyrites 24,458 tons, averaging 37.3 per cent sulphur.

Exports of sulphuric acid during 1919 were 10,894,200 pounds, valued at \$108,392. Imports of sulphuric acid in 1919 were 1,437 tons, valued at \$38,759.

	1916.		1917.		1918.		1919.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		\$		\$		\$		\$
Ore used—								
Sulphur..... Tons.	20,566		25,994		25,552		2,245	
Pyrites..... "	62,681		66,128		75,941		54,879	
Production..... † "	124,920		153,530		190,621		63,596	
Imports..... "	2,403	115,173	216	15,680	5,954	208,288	1,437	38,759
Exports..... "	1,576	74,527	9,478	197,888	5,600	165,579	5,447	108,392

*Record includes a small production of oleum and other grades, the strength of which is not specified. An approximate estimate of production in terms of 50° acid will be obtained by increasing these figures by 50 per cent.

†Tons of 66° Bé acid.

QUARTZ (SILICA).

The statistics of quartz, or silica production given in the tabulated statement herewith include chiefly the quartz or quartzite used in the smelting of nickel and copper ores, in the manufacture of ferro-silicon, and in the manufacture of sanitary ware, or earthenware. Production of silica in the form of infusorial earth has already been included under tripolite, and a small production of silica in the form of crushed sandstone used in the manufacture of glass and for foundry work in steel plants is included in the statistics of sandstone production.

The total shipments of quartz, or quartzite, in 1919 was 94,991 tons, valued at \$527,635.

Imports of silex, a finely ground quartz, in 1919 were 641 tons, valued at \$13,825, and the imports of flint were 5,411 tons, valued at \$100,902.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production—								
Quebec.....	1,149	1,436	550	1,788	1,730	5,383	2,221	7,773
Ontario.....	94,519	167,636	177,983	362,251	216,539	474,772	60,055	179,549
British Columbia.....	41,077	82,154	37,755	132,143	49,886	149,658	32,715	340,313
	136,745	251,226	216,288	496,182	268,155	629,813	94,991	527,635
Imports—								
Silex.....	1,677	18,297	851	12,812	607	12,054	641	13,825
Flint.....	5,349	71,983	3,774	64,292	5,749	109,825	5,411	100,902

SALT.

The total sales of salt in 1919, including the salt equivalent of brine used for chemical manufacturing, were 148,301 tons, valued at \$1,397,929. These values as far as possible exclude the value of packages which amounted to \$573,795. By grades the production included: table and dairy, 34,396 tons; common fine, 47,571 tons; common coarse, 64,426 tons; and land salt, 1,908 tons.

The number of men employed in 1919 was 329; wages paid, \$350,141.

The Canadian production was obtained almost entirely from the salt field in southern Ontario. Some years ago there was a small production from brines near Sussex, New Brunswick, and at lake Winnipegosis in Manitoba. The deposit of rock salt opened up in the neighbourhood of Malagash, Cumberland county, Nova Scotia, continued development work during 1917 and shipped about 174 tons in 1919. This is the first known discovery of rock salt in the Maritime Provinces, and the first in Canada to be discovered at a depth sufficiently shallow to allow it to be won economically by actual mining. A small shipment was also reported from Senlac, Sask.

The exports of salt in 1919 were 617 tons, valued at \$14,573. The imports of salt were 147,406 tons, valued at \$1,310,129, and included: 51,941 tons of fine salt in bulk, valued at \$289,109; 33,173 tons of salt in packages, valued at \$467,581; and 62,292 tons of salt imported from Great Britain, or any British possession for the use of fisheries, valued at \$553,439.

The calculated consumption of salt in 1919 was 295,090 tons, valued at \$2,693,485 (the value of the imported salt being that at point of origin.)

Caustic soda and chloride of lime are manufactured by the Canadian Salt Company at their chemical works at Sandwich, Ont. The Brunner-Mond Canada, Ltd., Amherstburg, Ont., manufacture soda ash.

The imports of salt cake (sodium sulphate) in 1919 were 23,953 tons, valued at \$343,007; soda ash (sodium carbonate) 31,319 tons, valued at \$1,305,348; sal soda, 5,439 tons, valued at \$164,259, and chloride and hypochloride of lime, 8,909 tons, valued at \$304,691.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production—								
Table and dairy.....	35,045	247,456	34,252	.....	34,324	.....	34,396	.....
Common, fine.....	54,596	262,660	65,117	.....	54,210	.....	47,571	.....
Common, coarse.....	41,259	200,479	37,398	.....	41,152	.....	64,426	.....
Land salt.....	2,003	7,058	2,142	.....	2,041	.....	1,908	.....
Total*.....	132,903	717,653	138,909	1,047,792	131,727	1,285,039	148,301	1,397,929
Value packages.....		309,603		403,879		574,033		573,795
Stocks on hand, Dec. 31...	1,970		2,024		2,775		2,974	
Exports.....	153	2,223	(a)		893	16,743	617	14,573
Imports—								
Fine, in bulk ¹	34,035	111,130	44,973	184,792	51,450	294,676	51,941	289,109
In bags, barrels ²	7,680	59,980	12,293	120,665	13,941	156,736	33,173	467,581
All other ³	109,493	523,725	113,550	782,748	100,103	815,757	62,292	553,439
	151,208	694,835	130,816	1,088,205	165,494	1,267,169	147,406	1,310,129
Consumption of salt.....	283,958	1,410,265	269,725	2,135,997	296,328	2,535,465	295,090	2,693,485

*Quantity sold or used; value excludes packages. (e) Estimated.

¹Duty 5c. per 100 pounds; ²Duty 7½c. per 100 pounds; ³Free—Imported for use of fisheries.

(a) Correct figures not available.

TALC.

The total shipment of crude and ground talc by mine operators during 1919 were 18,642 tons, valued at \$116,295. A considerable portion of the shipment of crude mineral included above is ground at Madoc, and the total shipments of ground talc during 1919 were 15,927 tons of varying grades having an average value of about \$14.75 per ton, as compared with 15,903 tons averaging about \$14 in 1918. Crude talc sold at from \$4 to \$5 per ton.

The Henderson mine has been operated for some years, the greater part of the output being sold to Geo. H. Gillespie & Co., who operate a grinding mill at Madoc, the balance being exported to United States. The Connolly Mine, of the Anglo-American Talc Corporation, was also operating, as well as the Eldorado mine of the Eldorado Mining & Milling Co. Small shipments of talc were reported from British Columbia in 1916, 1917, and 1919.

Exports of talc for the twelve months ending December 31, 1919, were valued at \$210,150, being: crude talc, 805 tons, valued at \$4,740; refined talc, 9,624 tons, valued at \$158,863, for the last nine months of the year; crude and refined for the first three months were valued at \$46,547.

Imports of talc have not been separately recorded since 1915.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production (a)—								
Crude.....	13,051	48,575	13,184	51,856	12,772	47,494	12,243	49,074
Refined.....	53	848	2,619	24,683	5,397	71,703	6,399	67,221
	13,104	49,423	15,803	76,539	18,169	119,197	18,642	116,295
Exports**.....				131,637		208,301		210,150
Total refined sold (b)....	8,198	98,588	13,703	171,788	15,903	222,167	15,927	235,000

Imports not separately recorded. ** Not recorded prior to April, 1917.

(a) Mine operators' returns. (b) Product Canadian plants.

STRUCTURAL MATERIALS AND CLAY PRODUCTS.

INTRODUCTORY.

The subjects included under this heading comprise cement, clay products of various kinds, such as brick, sewerpipe and tile, pottery, etc., lime, sand-lime brick, sand and gravel, slate, and stone for building and other purposes, including granite, marble, limestone, sandstone, etc.

The total value of the production of these structural products in 1919 was \$27,-421,510, as compared with \$19,130,799 in 1918, \$19,837,311 in 1917, and \$17,467,186 in 1916, the increase in 1919 being \$8,290,711, or 43.3 per cent, as compared with the previous year.

The total value of this class of imports in 1919 was \$6,691,291, as against \$8,117,394 in 1918, \$7,901,398 in 1917, and \$5,562,220 in 1916.

The total exports were valued at \$944,273, as against \$608,886 in 1918, \$647,369 in 1917, and \$681,239 in 1916.

The apparent total consumption based upon the record of production, imports and exports, was, therefore, in 1919, valued at \$33,168,528, as compared with \$26,639,307 in 1918, \$27,091,340 in 1917; and \$22,348,167 in 1916, the increase in value of consumption in 1919 being \$6,529,221.

A summary of the production, imports, exports, and consumption of structural materials and clay products in 1919 follows.

Structural Materials, Calendar Year 1919.

	Production.	Imports.	Exports.	Consumption.
	\$	\$	\$	\$
Cement, portland.....	9,802,433	64,443	465,954	9,400,922
Clay products.....	7,906,366	5,269,328	164,254	13,011,440
Lime.....	2,310,607	53,190	128,810	2,234,987
Sand-lime brick.....	484,854			484,854
Sand and gravel.....	2,680,460	200,428	131,140	2,749,748
Slate.....	10,853	142,977		153,830
Stone.....	4,225,937	960,925	54,115	5,132,747
	27,421,510	6,691,291	944,273	33,168,528

CEMENT.

The total quantity of cement sold from Canadian cement mills in 1919 was 4,995,257 barrels, valued at \$9,802,433, or an average of \$1.96 per barrel—an increase in quantity sold of 1,403,776 barrels, or 39 per cent, and an increase in total value of \$2,725,930 or 38½ per cent.

Sales of cement from mills in Quebec in 1919 were 2,260,422 barrels, valued at \$4,340,010; in Ontario, 2,023,280 barrels, valued at \$3,650,585; and from Manitoba, Alberta, and British Columbia, 711,555 barrels valued at \$1,811,838.

The total quantity of cement made in 1919 was 4,613,588 barrels, as compared with 3,417,600 barrels in 1918, an increase of 1,195,928 barrels, or 35 per cent.

Stocks of cement on hand January 1, 1919, were 1,471,865, and at the end of December had been reduced to 1,089,970 barrels.

The total imports of cement in 1919 were 49,232 hundredweight, equivalent to 14,066 barrels of 350 pounds each, valued at \$51,314, or an average of \$3.65 per barrel.

The total consumption of cement, therefore, was 4,831,817 barrels, an increase of 1,234,423 barrels, or 34.3 per cent.

	1916.		1917.		1918.		1919.	
	Brl.	Value.	Brl.	Value.	Brl.	Value.	Brl.	Value.
Plants—		\$		\$		\$		\$
Active— No.								
Capacity.....	15—38,475		9—28,340		10—29,275		10—30,025	
Idle—No.								
Capacity.....	14—14,940		17—21,890		13—18,940		11—19,000	
Output—								
Marl.....	164,436		96,755		86,532		110,899	
Limestone.....	4,588,597		4,890,500		3,331,128		4,512,689	
	4,753,033		4,987,255		3,417,660		4,613,588	
Sold or used.....	5,369,560	6,547,728	4,768,488	7,724,246	3,591,481	7,076,503	4,995,257	9,802,433
Stocks Dec. 31....	1,444,875		1,660,406		1,480,565		1,089,970	
Imports—								
Portland.....	20,596	31,621	8,580	19,646	5,913	19,851	14,066	51,314
Manufactures.....		12,126		8,710		8,509		13,129
Exports.....		2,424		16,857		13,752	(a) 177,506	465,954
Consumption.....	5,390,156		4,777,068		3,597,394		4,831,817	

(a) Quantity not recorded but estimated at the rate of 75 cents per cwt. or \$2.62½ per barrel.

CLAYS AND CLAY PRODUCTS.

For a number of years a small quantity of fireclay has been produced and sold as such, and during the past few years there has been a small production of kaolin, or china-clay, from a deposit in the province of Quebec. With these exceptions, the clay production in Canada consists almost altogether of the manufactured product.

The clay products made in Canada comprise brick of various kinds, including common and pressed, ornamental and fancy building brick, paving brick, firebrick, porous fireproofing brick and blocks, sewerpipe and drain tile, pottery and sanitary ware, the last two products chiefly from imported clays.

The total value of the clay products sold or marketed in 1919 was \$7,906,366, as compared with a value of \$4,583,489 in 1918, \$4,779,038 in 1917, and \$4,120,805 in 1916. The value of the production in 1919 shows an increase of \$3,322,877 as compared with the previous year.

The average number of men employed in 1919 was 4,613, as compared with 3,423 in the previous year, and the total wages paid were \$3,356,464, as against \$2,131,614.

Of the total value of the sales in 1919, building brick and fireproofing contributed \$5,627,138, or about 71.2 per cent. Sewerpipe and tile production, \$1,690,656, or 21.3 per cent. The total value of the production of pottery was \$890,320, of which \$185,474 only is estimated as attributable to Canadian clays, the balance being credited to imported clays.

The value of the production of fireclays and firebrick from domestic clays was \$389,354, and the production of kaolin was 759 tons, valued at \$13,744.

Detailed statistics of production of the several classes of clay products by provinces in 1919, are shown in the following table:—

Production of Clay Products by Provinces, 1919.

Province.	Per cent of total value.	No. of active firms reporting.	No. of men employed.	Wages.	Common brick.				Pressed brick.			
					No. manu- factured.	No. sold.	Value of sales.	Per M	No. manu- factured.	No. sold.	Value of sales.	Per M
Nova Scotia.....	5.48	8	281	\$ 154,966	18,060,000	20,246,000	\$ 216,123	\$ 10.67	50,000	50,000	\$ 1,000	\$ 20.00
New Brunswick.....	0.67	3	55	25,748	1,300,000	1,070,000	14,433	13.49				
Quebec.....	19.95	15	961	647,334	94,123,320	83,450,360	1,020,779	12.23	13,548,720	10,815,879	165,591	15.31
Ontario.....	57.86	154	2,380	1,953,700	152,171,986	145,037,954	2,139,687	14.75	56,083,725	52,512,553	917,648	17.47
Manitoba.....	1.67	5	190	54,823	7,576,000	6,617,000	131,737	15.29				
Saskatchewan.....	3.43	7	129	78,589	6,059,000	6,214,300	65,092	10.48	2,081,000	2,152,000	49,507	23.01
Alberta.....	7.23	9	445	292,396	20,321,932	24,141,932	228,730	9.47	7,944,510	7,955,235	142,190	17.87
British Columbia.....	3.71	8	172	148,908	2,665,450	2,692,450	33,638	12.50	1,438,036	938,036	28,226	30.09
Total.....	100.00	221	4,613	3,356,464	302,277,688	291,469,996	3,850,219	13.21	81,145,991	74,423,703	1,304,162	17.52

Province.	Fireproofing.		Ornamental and terra-cotta.		Refractories		Hollow building blocks.		Pottery.		Sewerpipe.		Tiles, drain.		Kaolin.	Total.
	Tons.	Value.	No. sold.	Value.	Value.	No. sold	Value.	Value.	Value.	Tons.	Value.	M	Value.	Value.	Value.	Value.
Nova Scotia.....		\$			\$ 60,605	32,000	\$ 4,800	\$ 36,336	\$ 6,415	147,555	126	\$ 2,817		\$		\$ 432,900
New Brunswick.....					2,172											52,941
Quebec.....	13,499	80,996		8,861	42,665			10,478	12,665	227,974	121	6,488	13,744			1,577,576
Ontario.....	16,023	170,296		41,841	69,565	1,072,115	28,656	44,820	39,678	609,099	19,047	553,184				4,574,796
Manitoba.....																131,737
Saskatchewan.....					41,086				3,617	76,804	385	38,500				270,989
Alberta.....	11,884	94,090			173,261	586,733	9,226	93,840			88	3,873				571,949
British Columbia.....						294,000	33,991		446	12,714	312	11,648				293,478
Total.....	41,406	345,382	(c)	50,702	(b)	1,984,848	76,673	(a)185,474	62,821	1,074,146	20,078	616,510		13,744		7,906,366

(a) There was also a production of \$704,846 from imported clays. (b) There was also a production of \$64,133 from imported clays. (c) of which \$40,527 is credited to terra-cotta.

Clay Paving Brick.—Paving brick has been made in Canada, chiefly at West Toronto, Ont., from shale obtained from the banks of the Humber river, and more recently during the years 1915 and 1916 there was a small production reported from Clayburn, B.C. There was no production reported for the past three years. The annual production for a number of years varied from 3,000,000 to over 5,000,000 per season.

Drain Tile.—The total sales of drain tile in Canada as reported to this branch were 20,078 thousand, valued at \$616,510. The greater part of this production is from Ontario, the sales in this province as reported by the producers being 19,047 thousand, valued at \$553,184.

Kaolin.—The shipments of kaolin in 1919 were 759 tons, valued at \$13,744, as compared with 863 tons, valued at \$19,299, in 1918.

The production was obtained from the deposits in the township of Amherst, Ottawa county, Quebec, operated by the Canadian China Clay Company, of Toronto.

The plant for refining the clay is situated 2 miles from St. Remi d'Amherst, and 7 miles from Huberdeau, the terminus of the Montfort branch of the Canadian National Railway, 46 miles northwest of Montreal.

Pottery.—Sanitary porcelain is made at St. Johns, Que., and electrical porcelain is made at Hamilton and Peterborough, Ont. These are the only firms in Canada at present making white wares. The raw materials, including clays, ground quartz and feldspar are all imported.

Stoneware pottery, such as crocks, jars, churns, and jardinières, is made at Medicine Hat, Alta., from Saskatchewan clay; at Hamilton, Ont., from imported clays; and at St. John, N.B., partly from Nova Scotia clay.

Flower pots are made at a few localities from the red burning and tile clays of the vicinity.

Refractories.—The total value of the sales of fireclay, firebrick, fireclay brick and magnesite brick in 1919 was \$389,354. There was in addition a production of fireclay products, valued at \$64,133, reported as being made from imported clays. The production in 1919 included: Fireclay, or refractory clay sold as such, 4,600 tons, valued at \$24,163; firebrick, including silica brick and magnesite brick in addition to fireclay brick, 5,610 thousand, valued at \$268,756; and other fireclay products valued at \$96,435.

Sewerpipe.—The total sales of sewerpipe in 1919 were 62,821 tons, valued at \$1,074,146. About 56.7 per cent of the value of the production is credited to Ontario.

		1916.		1917.		1918.		1919.	
		Quant'y	Value.	Quant'y	Value.	Quant'y	Value.	Quant'y	Value.
			\$		\$		\$		\$
Manufactured—									
Common brick....	M	241,521		216,596		163,960		302,278	
Pressed brick....	M	43,361		51,472		38,171		81,146	
Stocks, Dec. 31—									
Common.....	M	85,879		57,596		57,419		51,110	
Pressed.....	M	15,778		17,273		11,665		18,458	
Production—									
Common.....	M	237,035	1,826,844	210,631	1,999,465	164,970	1,879,811	291,470	3,850,219
Pressed.....	M	44,947	492,355	46,409	653,153	40,147	639,083	74,424	1,304,162
Fire proofing.....	Tons.				299,645	28,087	226,798	41,406	345,382
Hollow building blocks.....	M		361,555		95,088	1,402	40,876	1,985	76,673
Kaolin.....	Tons.	1,750	17,500	533	9,594	863	19,299	759	13,744
Ornamental.....	M		21,102		32,854	358	28,296	365	10,175
Terra-cotta.....	M				21,380	175	15,146		40,527
Paving.....	M	1,590	30,144						
Pottery.....			61,069		122,878		130,242		185,474
Refractories—									
Fireclay.....	Tons.	9,206	30,767	10,534	49,455	8,732	44,351	4,600	24,163
Firebrick.....	M	5,689	147,757	8,192	199,171	7,192	248,884	5,610	268,756
Other products..	Tons.		56,038		77,885		111,589	2,946	96,435
Sewerpipe.....	Tons.		716,287		783,762	36,574	699,774	62,821	1,074,146
Tile, drain.....	M		359,387		434,708	19,762	499,340	20,078	616,510
			4,120,805		4,779,038		4,583,489		7,906,366
Imports—									
Bath brick.....			902		2,299		2,134		1,135
Building brick....	M	10,083	118,687	4,111	61,511	3,232	55,976	7,394	128,876
Bldg. blocks.....			69,353		151,765		64,622		102,107
Clays—									
China.....	Tons.	19,062	114,110	11,596	97,856	10,538	116,699	8,643	129,652
Fire.....			187,124		283,746		401,357	30,777	185,156
Pipe.....			2,440		2,427		2,167		922
Other clays.....			21,820		32,180		34,130		46,420
Drain tile, unglazed.....			2,072		2,289		481		481
Drain and sewerpipe.....			40,233		42,864		24,763		66,727
Earthen and chinaware.....			2,180,414		2,595,582		2,163,455		2,925,295
a Firebrick.....			1,162,679		1,994,212		2,852,233		906,481
Firebrick, n.o.p.....			495,113		691,578		650,341		434,505
b Magnesite brick.....					470,801		210,103		120,189
Paving brick.....	M	5,667	70,268	2,190	37,814	798	17,534	3,552	77,374
Other clay mfrs.....			88,952		143,913		138,086		144,008
			4,554,167		6,610,837		6,734,081		5,269,328
Exports—									
Bldg. brick.....	M	1,746	13,942	4,464	40,039	3,277	34,593	4,770	52,050
Clay—									
Unmanufactured Cwt.			58,550		83,600		129,691	5,901	3,672
Manufactures.....									84,953
Earthenware.....			7,620		14,504		10,633		23,579
			80,112		138,143		174,917		164,254
Consumption.....			8,594,860		11,251,732		11,142,653		13,011,440

(a) Duty free; of a kind not made in Canada.

(b) Not separately shown prior to April, 1917.

LIME.

The production of lime in 1919 is reported as 7,147,504 bushels, valued at \$2,310,607, or an average of 32.3 cents per bushel. Fifty-eight firms reported with 868 men employed, and wages \$829,459.

The average price per bushel of lime sold in 1919 varied from a minimum of 20 cents in Nova Scotia to a maximum of 53½ cents in British Columbia. About 87 per cent of the total production was derived from Ontario, Quebec, and the Maritime Provinces. The production of hydrated lime was 27,950 tons, valued at \$295,164.

The exports during 1919 were 9,654 tons, valued at \$128,810, while the imports were 3,977 tons, valued at \$53,190.

	1916.		1917.		1918.		1919.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Production—	Bush.	\$	Bush.	\$	Bush.	\$	Bush.	\$
Nova Scotia....	909,800	181,960	985,286	197,057	748,314	149,663	366,543	73,309
P. E. Island.....	1,734	546	820	287				
New Brunswick....	424,113	104,635	532,251	171,248	482,548	221,935	468,533	223,193
Quebec.....	1,498,845	267,119	1,470,486	335,012	1,527,784	418,888	1,796,822	493,762
Ontario.....	2,031,396	367,115	2,846,850	668,368	2,660,791	762,976	3,578,834	1,143,973
Manitoba.....	355,301	83,754	393,982	92,932	462,544	134,725	476,452	147,131
Alberta.....	78,019	20,033	104,540	35,516	80,408	44,141	109,067	41,276
Br. Columbia....	194,042	66,301	232,955	58,067	401,562	143,697	351,253	187,963
	5,493,250	1,091,463	6,567,170	1,558,487	6,363,951	1,876,025	7,147,504	2,310,607
Hydrated lime produced ¹	Tons.		Tons.		Tons.		Tons.	
	9,137	56,775	16,339	126,268	18,133	167,250	27,950	295,164
Imports.....	21,178	96,332	12,150	78,254	4,987	53,745	3,977	53,190
Exports.....		66,406		74,523	7,483	70,930	9,654	128,810

¹Included in total production of lime.

SAND-LIME BRICK.

The first record of the production of sand-lime brick in Canada was obtained for the year 1907, when there was a production by ten firms amounting to 16,492,971 brick, valued at \$167,795.

In 1919 the sales were reported at 33,553,699 brick, valued at \$484,854, or an average of \$14.75 per thousand, as compared with sales in 1918 of 14,589,324 brick, valued at \$186,066.

	1916.		1917.		1918.		1919.	
	M.	Value.	M.	Value.	M.	Value.	M.	Value.
		\$		\$		\$		\$
Manufactured.....	13,884		17,080		15,256		36,111	
Sold or used.....	16,541	126,235	18,002	201,355	14,589	186,066	33,554	484,854
Stocks, Dec. 31.....	5,178		3,259		2,610		2,244	

SAND AND GRAVEL.

The total sales of sand and gravel produced in Canada during 1919 amounted to 10,364,481 tons, valued at \$2,680,460. This production included: building sand and gravel for concrete and road building, 1,100,827 tons, valued at \$602,138; gravel, including sand and gravel and crushed gravel, 1,039,104 tons, valued at \$606,486; railway ballast, 8,119,387 tons, valued at \$1,373,704; moulding sand, 55,451 tons, valued at \$71,249; and other sands, core sands, engine sands, etc., 49,712 tons, valued at \$26,883.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production—								
Sand.....	1,379,319	475,811	1,505,907	614,272	1,019,770	412,357	1,100,827	602,138
Sand and gravel	2,058,900	767,530	2,214,369	904,584	1,477,851	750,010	1,039,104	606,486
Ballast.....	4,559,686	521,189	5,312,218	718,801	8,633,917	1,087,207	8,119,387	1,373,704
Moulding sand..	19,251	16,726	46,790	46,018	62,835	71,488	55,451	71,249
All other.....	139,051	57,064	103,133	42,574	67,909	45,956	49,712	26,883
	8,156,207	1,838,320	9,182,417	2,326,249	11,262,282	2,367,018	10,364,481	2,680,460
Imports.....	233,777	183,894	328,520	312,403	310,610	435,992	200,830	200,428
Exports.....	1,114,913	388,309	1,075,374	290,964	902,750	229,957	1,074,341	131,140

SLATE.

There is a small annual production of slate in Canada, obtained from the New Rockland quarries, Melbourne township, Richmond county, Quebec, operated by the New Rockland Slate Co., Ltd.

The production in 1919 was 1,632 squares, valued at \$10,853, as compared with the production in 1918 of 933 squares, valued at \$5,124.

Exports have not been reported since 1909. The imports of slate during the past twelve years have ranged in value from \$90,000 to over \$200,000 per annum. During the calendar year 1919, they were valued at \$142,977.

	1916.		1917.		1918.		1919.	
	Squares	Value.	Squares	Value.	Squares	Value.	Squares	Value.
		\$		\$		\$		\$
Production.....	1,262	6,223	1,422	7,789	933	5,124	1,632	10,853
Imports—								
Roofing.....	4,412	21,335	3,909	20,785	8,296	47,975	4,036	27,623
School-writing.....		35,887		40,603		41,122		46,342
Pencils.....		11,309		8,717		10,361		10,059
All other.....		28,245		36,788		33,596		58,953
		96,776		106,893		133,054		142,977

STONE.

Statistics of stone production given herewith include the sales of all classes of stone used for building, monumental, and ornamental purposes, stone for paving purposes, curbstone and flagstone, rubble, riprap and crushed stone, limestone for furnace flux, sugar factories, etc., but stone used for burning lime or manufacturing cement is not included.

The kinds of stone quarried have been classed as granite (including trap rock, syenite, and other igneous rocks), limestone, sandstone, and marble.

The records are practically confined to quarry operations, and to the production of sawn or polished stone when these operations are carried on by quarry operators. In addition to this production of stone by regular operators, there is no doubt a large stone production by individuals, such as farmers and others, for house or barn foundations, concrete work, etc., of which it would be impracticable to obtain any satisfactory record. Much stone is also used in railway construction work and in road building, of which the record is probably very incomplete.

The total value of the production of stone during 1919, according to returns received, was \$4,225,937, as compared with a value of \$3,036,574 in 1918, showing an increase of \$1,189,363.

The number of active firms reporting in 1919 was 159, the total number of men employed 2,999, and total wages paid \$2,060,870.

Production of Stone by Kinds and by Provinces, Showing Purposes for which Used, 1919.

By kinds.	Building	Ornamental and monumental	Paving and curbstone.	Rubble.		Crushed.		Furnace Flux.		Total Value.	Per cent of Total.
				Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.		
Granite.....	\$ 89,894	\$ 281,112	\$ 97,299	30,981	\$ 27,366	343,578	\$ 354,892	.....	\$ .....	\$ 850,563	% 20.13
Limestone.....	318,143	14,047	3,069	456,437	358,709	1,928,447	1,846,861	533,535	533,986	3,074,815	72.76
Marble.....	188,490	19,692	.....	80	200	1,760	5,600	.....	.....	213,982	5.06
Sandstone.....	17,524	.....	3,503	13,741	16,463	15,481	49,087	.....	.....	86,577	2.05
By Provinces.											
Nova Scotia.....	8,222	18,657	2,000	4,491	7,685	18,161	41,438	311,620	335,192	413,194	9.78
New Brunswick.....	3,000	(1) 68,398	14,143	150	724	11,858	29,511	3,461	9,518	125,294	2.96
Quebec.....	489,321	190,832	55,737	16,060	14,569	636,370	685,052	7,317	6,408	1,441,919	34.12
Ontario.....	71,104	34,632	16,241	443,985	324,636	1,505,691	1,327,966	183,527	161,689	1,936,268	45.82
Manitoba.....	39,304	.....	.....	5,288	25,859	16,456	18,661	3,495	5,243	89,067	2.11
Alberta.....	1,500	.....	.....	1,014	.....	1,014	1,166	455	1,523	3,189	0.07
British Columbia.....	1,600	2,332	15,750	31,265	29,265	99,716	152,646	23,660	15,413	217,006	5.14
Total.....	614,051	314,851	(a) 103,871	501,239	402,738	2,289,266	2,256,440	533,535	533,986	4,225,937	.....
Per cent.....	14.5	7.5	2.5	.....	9.5	.....	53.4	.....	12.6	.....	100.00

(1) Finished stone valued at \$172,745. (a) 12,755 tons, subdivided as follows: granite, 11,810 tons; limestone, 390 tons; sandstone, 555 tons.

	1916.		1917.		1918.		1919.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		\$		\$		\$		\$
Production—								
Granite.....		1,247,267		639,412		590,871		850,563
Limestone.....		2,224,091		2,283,659		2,342,403		3,074,815
Marble.....		118,810		55,820		550		213,982
Sandstone.....		146,244		261,256		102,750		86,577
Production—								
Nova Scotia.....		459,298		569,521		478,721		413,194
New Brunswick.....		112,257		111,150		99,044		125,294
Quebec.....		1,370,465		991,593		952,402		1,441,919
Ontario.....		857,023		992,455		1,079,745		1,936,268
Manitoba.....		372,894		301,968		238,251		89,067
Alberta.....		257		7,482		569		3,189
British Columbia.....		564,218		265,978		187,842		217,006
		3,736,412		3,240,147		3,036,574		4,225,937
Exports—								
Crushed.....	26,754	27,611	2,308	2,277	1,526	1,983	13,176	12,990
Ornamental, rough (a)...	15,967	7,989	330	359	1,042	5,059	846	7,118
Building, rough (b).....	128,453	103,796	139,153	122,430	62,683	107,690	16,859	23,899
Dressed.....		4,592		1,816		4,598		10,108
		143,988		126,882		119,330		54,115
Imports—								
Building stone.....		112,349		176,134		125,132		212,191
Granite.....		133,229		132,645		85,652		110,583
Marble.....		171,849		199,697		234,862		438,623
Refuse stone.....		169,877		256,182		236,516	416,220	199,528
		587,304		764,658		732,162		960,925

(a) Granite, marble, etc., unwrought. (b) Freestone, limestone, etc., unwrought.

-D-28

CANADA

DEPARTMENT OF MINES

HON. SIR JAMES A. LOUGHEED, MINISTER; CHARLES CAMSELL, DEPUTY MINISTER

MINES BRANCH

JOHN MCLEISH, ACTING DIRECTOR

ANNUAL REPORT



ON THE

MINERAL PRODUCTION OF CANADA

During the Calendar Year

1920



OTTAWA

F. A. ACLAND

PRINTER TO THE KING'S MOST EXCELLENT MAJESTY

1921

No. 568

CANADA
DEPARTMENT OF MINES

HON. SIR JAMES A. LOUGHEED, MINISTER; CHARLES CAMSELL, DEPUTY MINISTER

MINES BRANCH

JOHN MCLEISH, ACTING DIRECTOR

ANNUAL REPORT

ON THE

MINERAL PRODUCTION OF CANADA

During the Calendar Year

1920



OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1921

INTRODUCTION

The Annual Report on the Mineral Production of Canada, presents revised statistical information descriptive of the mining and metallurgical production in Canada during the calendar year 1920 and replaces the preliminary report which was sent to press February 24, 1921, and issued the following week.

This report will be supplemented by separate and detailed reports on "The Production of Coal and Coke in Canada, 1920"; "The Production of Iron and Steel in Canada, 1920"; and "The Production of Copper, Gold, Lead, Nickel, Silver, Zinc and other Metals in Canada during 1920."

The section of the report dealing with metals and metalliferous ores has been prepared by Mr. A. Buisson; and the section dealing with non-metalliferous products, including structural materials, by Mr. John Casey.

The term "ton" is used throughout to signify a ton of 2,000 pounds and the year means calendar year, unless otherwise stated. The Government fiscal year prior to 1907 ended on the 30th June, but now terminates on the 31st March. The fiscal period ending March 31, 1907, covers only nine months.

Statistics of exports and imports are compiled from the reports of the Trade of Canada.

The term "production" may in general be interpreted to mean the quantity sold or shipped. Mineral products mined or manufactured, but not sold or shipped at the end of the year, are not included as "production." An exception to this usage is made in reference to pig-iron, in which case the statistics of production represent the quantities made.

The value of the metallic minerals produced, whether refined in Canada or not, is calculated on the basis of the average price of the metal in some recognized market. New York prices have usually been taken as the standard, except in the case of lead and zinc, for which the Montreal price is now used. The value of non-metallic products is given as at the mine or point of shipment.

The co-operation of Canadian mine and smelter operators who have, almost without exception, cheerfully furnished the department with statistics and information regarding their operations is gratefully acknowledged. Thanks are due also to railway and other transportation companies, and to smelter operators outside Canada for data furnished.

(Signed) John McLeish.
Chief, Division of Mineral Resources and Statistics.

September, 1921.

CONTENTS

	PAGE
INTRODUCTION..	3
MINERAL PRODUCTION OF CANADA—	
GENERAL SUMMARY—	
Mineral production in Canada, 1920 and 1919, comparative table..	9
General table of exports and imports..	13
Production by provinces, 1920 and 1919..	20
Mine production..	26
METALLIC PRODUCTS	
ALUMINIUM..	34
ANTIMONY..	34
COBALT..	34
COPPER..	35
GOLD..	37
IRON AND STEEL—	
Iron ore..	37
Pig-iron..	38
Steel..	39
LEAD..	40
MERCURY..	41
MOLYBDENUM..	41
NICKEL..	42
PLATINUM..	43
SILVER..	44
TIN..	45
TUNGSTEN..	45
ZINC; BRASS..	46
NON-METALLIC PRODUCTS	
ABRASIVE MATERIALS—	
Corundum..	47
Grindstones..	47
Tripolite..	48
ACTINOLITE..	49
ARSENIC..	49
ASBESTOS..	50
BARYTES..	51
CHROMITE..	52
COAL..	52
COKE..	54
FELDSPAR..	56
FLUORSPAR..	56
GRAPHITE..	57
GYP SUM..	58
MAGNESITE..	58
Metallic magnesium..	59
Magnesium sulphate..	59
MANGANESE..	60

	PAGE
MICA..	61
MINERAL PIGMENTS, IRON OXIDES..	61
MINERAL WATER..	62
NATURAL GAS..	62
PEAT..	63
PETROLEUM..	63
PHOSPHATE..	67
PYRITES..	68
Sulphuric acid..	68
QUARTZ..	69
SALT..	69
TALC..	71

STRUCTURAL MATERIALS AND CLAY PRODUCTS

CEMENT..	72
CLAY PRODUCTS..	73
LIME..	76
SAND-LIME BRICK..	77
SAND AND GRAVEL..	77
SLATE..	78
STONE..	78

THE MINERAL PRODUCTION OF CANADA

During the Calendar Year 1920

The preliminary report on the mineral production of Canada in 1920 was published on February 24, 1921, the statistical record being at that time partially estimated, and, therefore, subject to revision.

According to the revised statement now presented the total value¹ in 1920 was \$227,859,665, over ten million dollars in excess of the total value estimated in the preliminary report.

Compared with the total value of the production in 1919, which was \$176,686,390, that of 1920 shows an increase of about 29 per cent and the highest production on record.

The detailed comparative statement here presented shows the production of each important product during the past two years, the proportion which each contributes to the total production, and the increase or decrease as the case may be of the production in 1920 as compared with that of 1919.

The total value of the metallic production in 1920 was \$77,939,630, as against a value of \$73,262,793 in 1919, and \$114,549,152 in 1918, showing an increase of about 6.4 per cent in 1920, as compared with the previous year.

The total value of the production of non-metallic products in 1920 was \$149,920,035, as against \$103,423,597 in 1919, and \$96,752,745 in 1918. The value of non-metallic products in 1920 was greater than that of any previous year. Much of this increase is to be credited to higher prices realized for most of these products, though on the other hand important increases have been made in the quantities of products marketed including asbestos and the various classes of structural materials.

The total value of the production in 1886 was \$10,221,255, or about \$2.23 per capita. In ten years the value had increased to \$22,474,256, or \$4.38 per capita, more than twice the total in 1886, and nearly twice the production per capita. The next ten years witnessed an increase to \$79,286,697 in 1906, or \$12.81 per capita, about three and a half times the production in 1896. The total in 1920 was about three times that of 1906.

The record of annual mineral production in Canada since 1886 and the total annual production of metallic and non-metallic products since 1907 are shown in the following tables:—

¹ In presenting a total valuation of the mineral production as is here given, it should be explained that the production of the metals copper, gold, lead, silver, and zinc, is given as far as possible on the basis of the quantities of metals recovered in smelters, and the total quantities in each case are valued at the average market price of the refined metal in a recognized market. There is thus included, in some cases, the values that have accrued in the smelting or refining of metals outside of Canada.

Annual Mineral Production in Canada since 1886

Year	Value of production	Value per capita	Year	Value of production	Value per capita
	\$	\$		\$	\$
1886.....	10,221,255	2.23	1903.....	61,740,513	10.83
1887.....	10,321,331	2.23	1904.....	60,082,771	10.27
1888.....	12,518,894	2.67	1905.....	69,078,999	11.49
1889.....	14,013,113	2.96	1906.....	79,286,697	12.81
1890.....	16,763,353	3.50	1907.....	86,865,202	13.75
1891.....	18,976,616	3.92	1908.....	85,557,101	13.16
1892.....	16,623,415	3.39	1909.....	91,831,441	13.70
1893.....	20,035,082	4.04	1910.....	106,823,623	14.93
1894.....	19,931,158	3.98	1911.....	103,220,994	14.42
1895.....	20,505,917	4.05	1912.....	135,048,296	18.27
1896.....	22,474,256	4.38	1913.....	145,634,812	18.77
1897.....	28,485,023	5.49	1914.....	128,863,075	15.06
1898.....	38,412,431	7.32	1915.....	137,109,171	17.29
1899.....	49,234,005	9.27	1916.....	177,201,534	21.77
1900.....	64,420,877	12.04	1917.....	189,646,821	22.68
1901.....	65,797,911	12.16	1918.....	211,301,897	24.59
1902.....	63,231,836	11.36	1919.....	176,686,390	.....
			1920.....	227,859,665	.....

Annual Values of Metallic and Non-Metallic Production

Year.	Metallic	Non-Metallic		Total
		Fuels and other non- metallics	Structural or clay and stone quarry products	
	\$	\$	\$	\$
1907.....	42,426,607	31,275,546	12,863,049	(a) 86,865,202
1908.....	41,774,362	32,142,784	11,339,955	(a) 85,557,101
1909.....	44,156,841	31,141,251	16,533,349	91,831,441
1910.....	49,438,873	37,757,158	19,627,592	106,823,623
1911.....	46,105,423	34,405,960	22,709,611	103,220,994
1912.....	61,172,753	45,080,674	28,794,869	135,048,296
1913.....	66,361,351	48,463,709	30,809,752	145,634,812
1914.....	59,386,619	43,467,229	26,009,227	128,863,075
1915.....	75,814,841	43,373,571	17,920,759	137,109,171
1916.....	106,319,365	53,414,983	17,467,186	177,201,534
1917.....	106,455,147	63,354,363	19,837,311	189,646,821
1918.....	114,549,152	77,621,946	19,130,799	211,301,897
1919.....	73,262,793	76,002,087	27,421,510	176,686,390
1920.....	77,939,630	108,027,947	41,892,088	227,859,665

(a) Total includes \$300,000 allowed for products not reported.

Comparative Statement of Mineral Production for Years 1919 and 1920

Product	1919			1920			Increase (+) or Decrease (-)		Increase (+) or Decrease (-)
	Quantity	Value (a)	Per cent of total	Quantity	Value (a)	Per cent of total	Quantity	%	
							Value		
Metallic.									
Cobalt metallic and contained in oxide..... Lb.	530,371	1,325,928	0.75	546,023	1,365,058	0.60	+	15,652	2.95
Copper (b)..... " "	75,053,581	14,028,265	7.94	81,600,691	14,244,217	6.25	+	6,547,110	8.72
Gold..... " "	766,764	15,850,423	8.97	765,007	15,814,098	6.94	-	1,757	0.23
Iron, pig, from Canadian ore (c)..... Tons	38,457	899,406	0.51	75,869	2,066,997	0.91	+	37,412	97.28
Iron ore sold for export (d)..... " "	5,885	46,525	0.03	8,885	64,538	0.03	+	3,002	51.03
Lead (d)..... Lb.	43,827,699	3,053,037	1.73	35,953,717	3,214,262	1.41	-	7,873,982	17.97
Molybdenite..... " "	83,092	69,203	0.08	61,335,706	24,534,282	10.77	+	83,002	100.00
Nickel (e)..... " "	44,544,883	17,817,953	10.08	913	58,392	0.00	+	16,790,823	37.69
Palladium..... " "	62	3,534	0.00	595	37,080	0.00	+	851	54.888
Platinum (h)..... " "	50	3,597	0.00	513	31,815	0.00	+	545	34.083
Rhodium..... " "	16,020,657	17,802,474	10.07	13,330,357	13,450,330	5.90	+	2,690,300	16.78
Silver (j)..... " "	32,194,707	2,362,448	1.34	39,863,912	3,057,961	1.34	+	7,669,205	23.82
Zinc..... Lb.	.....	.....	.....	.....	.....	.....	+	.....	.....
Total.....	.....	73,262,793	41.46	.....	77,939,630	34.20	+	4,676,837	6.38
Non-metallic.									
Actinolite..... Tons.	80	880	.....	100	1,160	.....	+	20	25.00
Arsenic, white and in ore..... " "	3,389	509,924	0.29	2,459	447,848	0.20	+	930	27.44
Asbestos..... " "	136,765	10,909,452	6.17	178,617	14,734,399	6.47	+	41,852	30.60
Asbestic..... " "	22,471	65,917	0.03	20,956	57,602	0.02	+	1,515	6.74
Barites..... " "	468	8,154	0.03	751	22,983	0.01	+	283	60.47
Chromite..... " "	8,541	298,898	0.13	11,016	251,379	0.11	+	2,475	28.98
Coal..... " "	13,681,218	54,413,349	30.80	16,631,954	80,693,723	35.41	+	2,950,736	21.57
Corundum..... " "	.....	.....	.....	196	24,547	0.00	+	196	158.00
Feldspar..... " "	14,679	86,231	.....	37,873	280,895	0.12	+	23,194	158.00
Fluorspar..... " "	5,063	97,837	.....	11,235	240,446	0.10	+	6,172	121.90
Gypsum..... " "	1,360	100,221	.....	2,190	165,617	0.07	+	830	61.02
Graphite..... " "	179	.....	.....	104	.....	.....	+	75	41.99
Graphite, artificial..... " "	.....	60,516	.....	2,444	88,136	.....	+	424	20.99
Grindstones..... " "	2,020	1,215,287	0.69	429,144	1,893,991	0.83	+	130,081	43.50
Gypsum..... " "	299,063	328,465	0.19	18,378	512,756	0.23	+	7,105	63.03
Magnesite..... " "	11,273	9,115	.....	1,947	39,886	.....	+	1,209	163.82
Magnesium sulphate..... " "	738	14,159	.....	649	11,029	.....	+	12	2.14
Manganese..... " "	661	273,788	0.15	2,203	376,022	0.17	-	551	20.01
Mica..... " "	2,754	.....	.....	.....	.....	.....	+	.....	.....

Comparative Statement of Mineral Production for Years 1919 and 1920—Continued

Product	1919			1920			Increase (+) or Decrease (-)		Increase (+) or Decrease (-)	
	Quantity	Value (a)	Per cent of total	Quantity	Value (a)	Per cent of total	Quantity	%	Value	%
Mineral water.....		\$			\$				\$	
Natural gas (g).....	19,937,769	71,015		16,845,518	24,582	1.86	—	15.51	46,433	65.38
Oxides.....	11,862	4,176,037	2.36	19,128	4,232,642	1.86	+	61.25	56,605	1.36
Peat.....	986	113,427		4,550	157,909	0.07	+	361.46	44,482	39.22
Petroleum.....	240,466	736,324	0.42	196,251	822,235	0.36	+	18.39	12,089	184.26
Phosphate.....	24	331					+	100.00	85,911	11.67
Pyrites.....	176,487	522,704	0.30	174,744	719,110	0.32	—	74	331	100.00
Quartz.....	94,991	527,635	0.30	128,295	467,821	0.21	+	33.04	196,406	37.58
Salt.....	148,301	1,397,929	0.79	209,855	1,544,724	0.68	+	61,554	59,814	11.34
Sodium sulphate.....				811	19,496		+	41.51	146,795	10.50
Strontium.....	48	336		75	2,625		+	56.25	19,496	
Talc.....	18,642	116,285		21,671	166,834	0.07	+	27	2,289	
Tripolite.....	565	11,300		260	8,600		—	16.24	50,639	43.55
Total.....		76,002,087	43.02		108,027,947	47.41		53.98	2,700	23.89
Structural Materials and Clay Products.										
Cement, portland and puzzolan.....	4,995,257	9,802,433	5.55	6,651,980	14,798,070	6.49	+	33.17	4,995,637	50.96
Clay products—										
Brick, common.....	291,469,996	3,850,219	2.18	303,343,028	4,835,996	2.12	+	11,873,083	985,777	25.60
Brick, pressed.....	74,423,703	1,304,162	0.74	85,137,125	2,004,537	0.88	+	10,713,422	700,375	53.70
Brick, moulded and ornamental.....	364,682	10,175		3,515,000	73,926		+		63,751	
Fireclay, and fireclay products.....		389,354	0.22		474,113	0.21	+		84,759	21.77
Fireproofing.....	41,406	345,382	0.20	49,091	591,418	0.26	+	7,685	246,036	71.24
Hollow building blocks.....	1,984,848	76,673			302,261	0.13	+		225,588	294.22
Kaolin.....	759	13,744		683	15,022		—	76	1,273	9.30
Pottery.....		185,474			208,171		+		23,697	12.78
Sewerpipe.....	62,821	1,074,146	0.61	58,887	1,549,090	0.68	—	3,934	474,944	44.22
Terra-cotta lumber.....		40,527			46,743		+		6,216	15.34
Tile, drain.....							+		53,858	8.74
Line.....	20,078,000	616,510	0.35	14,527,000	562,652	0.25	—	5,551,000	1,507,946	65.26
Sand-line brick.....	33,553,699	2,310,607	1.31	9,427,334	3,818,553	1.68	+	2,279,833	31,900	49.51
Sand and gravel.....	10,364,481	2,680,460	1.52	45,459,000	724,918	0.32	+	11,905,000	240,064	60.09
Slate.....	1,632	10,853		11,530,795	4,291,067	1.88	+	1,166,314	1,610,607	30.84
					14,200		+		3,347	

EXPORTS AND IMPORTS

A very large portion of the mineral production of Canada is exported for consumption or refining outside of Canada. On the other hand considerable quantities of mine products, chiefly those which have been refined or subject to partial treatment, or in the form of manufactured goods ready for consumption, are imported.

The total value of the exports of products of the mine, including direct mine products and manufactures thereof, in 1920, was \$193,420,702, compared with \$179,957,897 in 1919, according to records compiled from the Monthly Reports of the Trade of Canada published by the Department of Trade and Commerce. The classification is that used in the Trade reports.

A revision of the classification makes comparison in detail with previous records difficult. Of the total exports in 1920, about \$60,000,000 can be attributed to metals either in crude or refined metallic form or contained in ores or some form of metallurgical product exported for further refining. About \$38,000,000 is attributed to asbestos, coal, mica, and various other non-metallic minerals. About \$12,000,000 is attributed to chemical products such as cyanamid, calcium carbide, ammonium sulphate, etc. The balance over \$83,000,000 is made up largely of manufactured products, chiefly manufactures of iron and steel, such as agricultural implements, machinery, boilers and locomotives, rolling-mill products, wire, etc.

A great variety of mineral products, chiefly in the manufactured or semi-manufactured condition, are annually imported into Canada. These imports increased in value with great rapidity during the ten years preceding 1913. During the next two years, however, there was a falling off, but in 1916 the imports again increased to a value almost equal to that of 1913. The total value of these imports during the calendar year 1920 amounted to \$482,060,739, as compared with a value of \$326,468,755 in 1919, \$350,610,946 in 1918, \$354,313,551 in 1917, \$256,346,726 in 1916, \$146,465,510 in 1915, \$181,675,667 in 1914, and \$259,299,745 in 1913.

It is perhaps significant that of the total value of these imports in 1920, over one-half, about 250 million dollars, consisted of iron and steel goods, and over 151 million dollars, or about 29 per cent of coal, coke, and petroleum.

Exports of Products of the Mine and Manufactures of Mine Products, Calendar Years 1919 and 1920

Products	1919		1920	
	Quantity	Value	Quantity	Value
		\$		\$
<i>Iron and its Products:</i>				
Chromite (chromic iron)..... Tons	9,078	198,733	8,431	151,456
Iron ore..... "	14,480	78,490	19,879	99,179
<i>Agricultural Implements:</i>				
Cream separators and parts..... \$		266,764		213,585
Harvesters and binders..... No.	14,136	2,773,756	13,427	2,804,524
Hay-rakes..... "	1,862	73,516	3,394	148,847
Mowing machines..... "	14,250	918,635	13,139	955,330
Reapers..... "	1,009	95,113	2,048	231,470
Cultivators..... "	11,250	638,741	6,470	434,666
Drills..... "	8,227	856,642	2,522	310,685
Harrows..... "	11,376	294,111	12,195	397,982
Ploughs and parts of..... \$		2,833,743		3,578,687
Seeders..... No.	352	38,307	90	7,240
Garden and farm tools..... \$		247,697		278,341
Spades and shovels..... "		219,368		234,942
Threshing machines, separators and parts..... "		2,184,605		918,667
Other agricultural implements and machines..... "		333,232		480,756
Parts of agricultural implements and machines, n.o.p..... "		988,041		1,202,272
<i>Boilers, Engines, Pumps and Windmills:</i>				
Gasoline engines and parts of..... No.	2,706	1,184,667	1,569	265,487
Locomotives and parts of..... "	130	5,874,091	77	3,463,914
<i>Cutlery and Hardware:</i>				
Bolts and nuts..... Cwt.	9,211	84,545	25,938	265,970
Cutlery..... \$		2,025,493		2,091,562
Hardware, n.o.p..... "		1,580,628		847,231
Nails, brads, spikes and tacks of all kinds..... Cwt.	126,823	761,988	100,714	749,771
Nails, wire..... "	204,772	1,302,413	787,919	4,834,407
Needles and pins of all kinds..... \$		72,793		131,500
Screws of all kinds..... "		46,820		111,841
<i>Machinery (except agricultural):</i>				
Adding and calculating machines..... "		253,261		
Dynamos, generators and motors..... "		105,531		103,720
Lawnmowers..... No.	4,879	29,872	14,467	81,402
Linotype machines and parts of..... \$		30,957		21,934
Sewing machines and parts of..... "		568,224		940,000
Typewriters..... No.	3,830	297,948	3,726	316,577
Washing machines, domestic and wringers..... \$		32,096		195,557
Other machinery and parts of, n.o.p..... "		5,852,327		3,897,804
<i>Rolling Mill Products:</i>				
Bars and rods..... Tons.	52,191	3,394,894	85,166	5,687,611
Metallic shingles and laths and corrugated roofing..... \$		18,514		59,573
Rails..... Tons.	30,737	1,297,836	61,117	2,676,933
Structural steel..... "	5,515	465,989	3,458	358,294
Tubes and piping..... \$		1,715,707		2,614,154
<i>Smelted Products:</i>				
Billets, ingots and blooms..... Tons.	28,087	1,731,529	69,269	3,696,974
Ferro-manganese and other ferro-products, n.o.p..... "	22,449	1,229,341	6,124	319,978
Ferro-silicon..... "			19,298	977,742
Pig-iron..... "	63,605	1,820,260	102,628	3,628,657
<i>Vehicles:</i>				
Automobiles, freight..... No.	3,352	1,673,256	4,942	3,059,056
" passenger..... "	19,597	11,580,260	18,070	13,576,179
" parts of..... \$		3,490,577		4,276,027
Bicycles..... No.	121	4,968	285	17,821
" parts of..... \$		114,683		222,166
Cars and coaches, railway, and parts of..... "		1,495,402		696,220
Motor vehicles, n.o.p..... No.	9	4,130	21	6,026
Other vehicles, n.o.p..... \$		103,387		428,240

*Last nine months, 1919.

**Exports of Products of the Mine and Manufactures of Mine Products, Calendar
Years 1919 and 1920—Continued**

Products	1919		1920	
	Quantity	Value	Quantity	Value
		\$		\$
<i>Wire:</i>				
Wire, barbed.....Cwt.	24,960	167,142	21,868	139,353
Wire, woven, fencing.....\$		88,140		160,880
Other wire, n.o.p.....		2,059,304		2,273,318
<i>Other Iron and Steel Products:</i>				
Castings, n.o.p.....\$		296,236		895,650
Forgings.....*		1,612,236		1,108,980
Furniture.....*		41,587		76,413
Guns, rifles and firearms of all kinds.....		2,735,086		31,971
Lamps and lanterns.....		80,129		77,726
Scales and weighing beams.....*		70,619		114,104
Scrap-iron and steel.....Tons.	245,214	3,779,179	129,015	2,447,684
Stoves of all kinds.....\$		124,331		175,271
Tinware.....		66,076		79,290
Tools, hand or machine, n.o.p.....		1,059,992		536,280
Other manufactures of iron and steel, n.o.p.....		6,645,007		3,169,403
<i>Non-Ferrous Metals and their Products:</i>				
Aluminium bars, blocks, etc.....Cwt.	145,763	4,455,031	197,163	6,094,628
Aluminium, manufactures of.....\$		59,339		175,057
Arsenic, metallic.....Cwt.	50,128	355,654		
Arsenic, n.o.p.....			33,093	313,311
Brass, old and scrap.....	96,569	1,275,448	34,398	475,809
Brass rods, sheets, tubing, etc.....	5,355	173,654	2,440	49,728
Brass valves.....\$		236,839		325,974
Copper, fine contained in ore, matte, regulus, etc.....Cwt.	408,513	5,316,151	473,297	5,918,782
Copper, blister.....*	199,561	3,747,355	381,989	8,701,184
Copper, old and scrap.....	31,170	537,225	7,744	113,265
Copper, in pigs, bars and sheets, etc.....	181,923	4,186,549	26,665	710,978
Copper, wire and cable, insulated..\$		867,360		433,097
Lead, metallic, contained in ore, etc.....Cwt.	131,429	616,278	75,494	385,839
Lead, in pigs, etc.....	113,268	772,734	188	1,846
Cobalt alloys.....Lbs.	3,402	14,878	10,219	43,970
Cobalt metallic.....	106,835	259,624	304,382	493,425
Nickel, fine contained in ore, matte, speiss.....Cwt.	303,954	4,785,173	517,010	9,006,140
Nickel, fine.....	106,210	3,292,420	84,983	2,982,717
Gold-bearing quartz dust, nuggets and bullion direct from milling operations.....\$		5,037,123		4,642,909
Jewellers' sweepings.....		262,643		284,493
Platinum contained in concentrates or other forms.....Oz.	325	28,815	473	53,956
Platinum, old and scrap.....	346	33,814	317	31,784
Silver, contained in ore, concentrates, etc.....	2,854,928	2,850,592	1,903,130	2,007,550
Silver, bullion.....	12,550,233	13,560,205	9,931,374	10,230,659
Zinc ore.....Tons.	6,630	296,212	3,126	122,387
Zinc spelter.....Cwt.	76,938*	701,249	69,799	512,279
<i>Other Non-Ferrous Metal Products:</i>				
Electric apparatus:				
Batteries, telegraph and telephone apparatus.....\$		1,175,226		53,002
Electric apparatus, n.o.p.....				493,591
Electrotypes and stereotypes.....		15,178		18,839
Molybdenum.....Cwt.	1,135	84,226	1	75
Ore, antimony.....Tons.	56	8,420		
Ore, manganese.....	603	13,401	640	19,921
Ores, other, n.o.p.....	8,727	8,512	41	830
Plated ware, n.o.p.....\$		119,326		134,733
Pyrites.....Tons.	89,089	388,508	30	63
Sulphur, (contained in pyrites).....			119,106	458,340
Metals, other, unmanufactured.....\$		39,182		93,444
Metals, other, manufactured, n.o.p.....		1,574,716		823,264

*Last nine months, 1919.

Exports of Products of the Mine and Manufactures of Mine Products, Calendar Years 1919 and 1920—Continued

Products	1919		1920	
	Quantity	Value	Quantity	Value
<i>Non-Metallic Minerals and their Products (except chemicals):</i>				
Asbestos.....Tons.	119,122	\$ 9,625,695	152,740	\$ 11,521,536
Asbestos, sand and waste....."	25,306	260,775	36,303	365,920
Asbestos, manufactures of.....\$		232,501		196,067
<i>Clay and Clay Products:</i>				
Bricks.....M.	4,770	52,050	8,073	115,627
Clays, unmanufactured.....Cwt.	5,901 *	3,672	4,738	2,175
Clay, manufactures of.....\$		84,953		196,222
Earthenware and all manufactures of....."		23,579		44,127
<i>Coal and Its Products:</i>				
Coal.....Tons.	2,070,050	12,438,885	2,558,174	18,014,899
Coke....."	14,709	129,703	39,536	390,161
Cinders.....\$		270		295
Tar and pitch.....Gal.		61,654	8,815,172	481,259
<i>Graphite and Its Products:</i>				
Graphite or plumbago, crude and refined.....Cwt.	20,055	72,917	42,830	159,817
Plumbago, manufactures.....\$		23,970		
<i>Mica and Its Products:</i>				
Mica, rough cobbled and thumb trimmed.....Cwt.	{ 54,821	641,366	848	55,724
Mica, scrap and waste....."			54,786	33,963
Mica, splittings.....			10,440	725,946
Mica, plate and manufactures of (micanite).....\$			596	8,474
<i>Mineral Waters:</i>				
Mineral water, natural, not in bottles Gal.	122	89	3	2
Mineral and aerated water in bottles \$		59,580		12,794
<i>Petroleum and Its Products:</i>				
Oil, coal and kerosene, crude.....Gal.	603,748	40,648	2,684,427	293,325
Oil, coal and kerosene, refined....."	2,846,293	287,170	1,243,335	205,999
Oil, gasoline and naphtha....."	1,566,707	428,754	160,433	59,432
Mineral wax.....Cwt.	71,259	626,799	26,915	230,172
<i>Stone and Stone Products:</i>				
Abrasives, natural, n.o.p., in ore or bulk, crushed or ground, including infusorial earth, rotten stone, tripoli, etc....."	8,529	10,743	81,330	236,569
Abrasives, artificial, crude, including carborundum....."		{ 1,520,218	598,664	1,579,508
Abrasives, artificial, made up into wheels, stones, etc.....\$				41,138
Corundum.....Tons			954	115,031
Grindstones, manufactured.....\$		38,682		41,705
Stone for the manufacture of grindstones, rough.....Tons.				
Freestone, limestone and other building stone, unwrought....."	16,859	23,899	9,612	16,246
Granite and marble, unwrought....."	846	7,118	1,729	16,941
Stones of all kinds, dressed.....\$		10,108		13,807
Cement.....		465,954		2,193,626
Gypsum, or plaster, crude.....Tons.	148,394	199,857	244,428	413,522
Lime.....Cwt.	193,073	128,810	460,310	381,899
Plaster of Paris, ground, and prepared wall plaster....."		140,235	251,521	232,736
Crushed stone.....Tons.	13,176	12,990	41,972	55,994
Sand and gravel....."	1,074,341	131,140	1,491,786	193,503
<i>Other Non-Metallic Minerals:</i>				
Carbon electrodes.....\$		691,747		30,768
Feldspar.....Tons.		104,285	38,768	219,744
Fluorspar....."	697 *	9,616	6,900	109,683
Glass and glassware, n.o.p.....\$		596,613		1,099,361
Magnesite, crude.....Tons.			155	1,662
Magnesite, calcined, dead burned...Cwt.		232,377	217,181	425,048
Salt....."	12,333	14,573	6,050	9,181
Talc, crude....."		210,150	6,284	10,653
Talc, refined....."			298,174	253,055
Other non-metallic minerals and products....."				38,158

*Last nine months, 1919.

**Exports of Products of the Mine and Manufactures of Mine Products, Calendar
Years 1919 and 1920—Concluded**

Products	1919		1920	
	Quantity	Value	Quantity	Value
		\$		\$
<i>Chemical and Allied Products:</i>				
Acid, sulphuric..... Cwt.	108,942	108,392	104,339	89,992
Cyanamid..... "	1,174,584	4,104,052	1,196,574	4,031,162
Phosphate rock..... Tons.	48	741	76	645
Other fertilizers, manufactured, n.o.p..... \$		241,934		317,676
Mineral pigments, iron oxide, ochres, etc..... Cwt.	15,349	25,229	30,561	78,913
Acetate of lime..... "	104,265	257,857	117,981	337,342
Ammonium sulphate..... "	369,763	1,821,880	366,585	1,896,660
Calcium carbide..... "	956,556	3,960,410	939,771	3,848,091
Cobalt oxides and cobalt salts..... Lbs.	468,225	731,506	595,739	1,137,586
Magnesium sulphate..... Cwt.	3 *	15	14,852	3,737
Potash, crude..... " *	633 *	8,559	720	19,009
		179,957,897		193,420,702

*Last nine months, 1919

IMPORTS

Imports of Products of the Mine and Manufactures of Mine Products—Calendar Years 1918, 1919, and 1920

Products	1918 Value	1919 Value	1920 Value
	\$	\$	\$
Alumina.....	2,071,060	1,565,264	1,889,064
Alum, alum cake and chloralum.....	382,132	228,250	561,162
Aluminium and manufactures.....	383,985	594,694	1,590,541
Ammonia, nitrate of.....	19,019	205,346	185,472
Ammonia, sulphate of.....	1,273	12,129	31,531
Antimony regulus.....	92,678	81,257	86,803
Antimony salts.....	18,986	8,548	10,676
Arsenic, oxide and sulphide of.....	33,573	27,938	43,646
Asbestos.....	604,703	656,037	1,047,031
Asphaltum.....	428,173	469,016	686,892
Bells and gongs.....	77,729	88,914	101,859
Bismuth.....	13,496	9,569	54,923
Blanc fixé and satin white.....	92,241	114,732	102,198
Blast furnace slag.....	18,506	416	18,343
Borax.....	199,210	227,638	263,869
Brick and tile.....	303,596	520,708	590,722
Brick, fire, of a kind not made in Canada; silica brick, magnesite brick, and n.o.p.....	3,712,677	1,618,549	2,792,959
Bromine and bromides.....	1,032	182	482
Burrstones.....	1,521	3,421	1,655
Cement, portland, and manufactures.....	* 28,360	64,443	130,919
Chalk, Cornwall stone, mica, schist.....			53,884
Feldspar.....	256,858	171,957	44,390
Fluorspar.....			113,818
Magnesite.....			49,799
Clays: china, fire, pipe, and all other.....	554,353	362,150	650,640
Coal: anthracite, bituminous, slack, and run-of-mine.....	71,650,584	61,160,799	98,033,598
Coke.....	8,975,445	2,405,740	6,458,596
Coke, ground, for electric batteries.....	22,849	26,615	29,970
Copper and manufactures of.....	6,372,412	7,147,783	10,836,206
Cryolite.....	167,586	143,141	163,414
Crucibles, clay or plumbago.....	113,856	59,239	176,711
Chloride of lime.....	162,748	304,691	1,179,663
Cyanides of potassium, sodium, cyanogen or cpd. of bromine.....	459,136	251,863	311,574
Diamonds, unset, and bort.....	1,367,801	3,632,026	3,821,610
Earthenware.....	2,163,455	2,925,295	5,380,462
Earths, crude.....	2,514	19,329	10,922
Electric carbons.....	793,030	709,621	905,466
Emery and manufactures.....	659,912	354,428	541,315
Fertilizers, compound or manufactured.....	1,054,962	1,201,121	2,335,001
Flint, quartz, silix, etc.....	121,879	114,727	196,452
Foundry facings.....	45,798	22,700	46,588
Fullers' earth.....	16,969	19,893	28,894
Fossils.....	11,324	16,395	37,530
Gannister.....	12,465	877	2,288
Gold and silver and manufactures of, including silver bullion.....	824,418	4,067,275	3,664,470
Graphite and manufactures of.....	226,777	87,574	106,920
Grindstones.....	297,287	281,066	312,672
Gypsum and plaster of Paris.....	22,065	47,455	78,302
Hydro-fluo-silicic acid.....	80	747	409
Iron and steel—Total, 1918: \$178,340,779 1919: \$173,210,710 1920: \$249,632,055			
Pig-iron and kentledge.....	2,102,435	1,022,871	2,383,442
Ferro products and chrome steel.....	4,335,109	943,584	1,380,496
Ingots, blooms, billets, puddled bars, etc.....	262,210	494,101	863,183
Scrap iron and scrap steel.....	775,526	484,407	2,341,365
Plates and sheets.....	14,114,139	12,820,340	10,130,224
Tin plates and sheets.....	11,403,887	6,436,047	21,805,164
Bars, rods, hoops, bands, etc.....	17,849,982	12,771,836	22,819,490
Structural iron and steel.....	11,004,159	11,157,643	12,269,345
Rails and connexions.....	561,970	774,935	1,169,065
Pipes and fittings.....	128,257	90,879	107,781
Nails and spikes.....	404,913	228,580	260,035
Wire.....	3,760,004	4,558,836	6,106,281
Forging castings and manufactures.....	3,829,760	3,811,213	5,400,480
Other iron and steel products.....	107,808,428	123,115,388	162,595,704

Imports of Products of the Mine and Manufactures of Mine Products—Calendar
Years 1918, 1919, and 1920—*Continued*

Products	1918 Value	1919 Value	1920 Value
	\$	\$	\$
Iron ore.....	5,895,974	4,706,440	5,812,912
Iron sand.....	67,528	10,247	17,000
Kainite.....	4,931	22,627	169,416
Lead and manufactures; litharge.....	1,350,689	1,022,265	3,008,958
Lime.....	53,745	53,190	48,790
Lithographic stone.....	2,757	10,698	6,271
Manganese, oxide of.....	93,477	89,314	93,062
Magnesia.....	13,200	61,740	84,339
Mercury or quicksilver.....	68,903	31,573	272,152
Metallic alloys:—			
Babbitt metal.....	27,062	31,863	85,568
Brass and manufactures of.....	4,670,140	4,257,738	6,337,775
Britannia metal and manufactures.....	25,898	15,105	32,919
German silver, nickel, and nickel silver.....	443,103	585,405	827,543
Type metal.....	85	200	152
Phosphor tin and phosphor bronze in blocks, bars, plates, sheets and wire.....	46,554	61,647	120,720
Yellow metal, in bars, bolts, or sheets, for use in the construction or repairs of vessels.....	5,229	11,354	4,373
Mineral and bituminous substances.....	914,442	629,865	1,016,287
Mineral water, including aerated water.....	105,967	113,743	178,511
Nickel anodes.....	-3,734	5,237	7,911
Ochres, etc.....	475,853	584,524	802,920
Ore, cobalt.....		43	520
Ores of metals, n.o.p.....	1,276,092	444,844	434,109
Paraffin wax.....	209,916	108,049	168,521
Paraffin candles.....	64,033	59,151	68,173
Petroleum and products of.....	30,477,543	29,394,190	46,861,638
Phosphates (fertilizer).....	90,363	30,267	114,480
Platinum and manufactures of.....	31,140	160,885	125,977
Potash and manufactures of.....	118,900	143,919	859,257
Precious stones.....	186,365	726,773	1,300,456
Pumice.....	36,938	29,910	57,068
Salt.....	1,267,169	1,310,129	1,434,687
Saltpetre.....	204,121	35,889	83,109
Sand and gravel.....	435,992	200,428	267,950
Slate and manufactures of.....	133,054	142,977	259,173
Sand paper.....	317,048	362,069	560,180
Soda products: barilla, bichromate, caustic, sal and salt cake	3,656,459	2,208,460	2,183,847
Stone and manufactures of (including marble).....	732,162	960,925	1,217,216
Soda, nitrate of.....	4,077,903	411,423	1,651,934
Sulphate of iron (copperas).....	7,783	16,761	29,288
Sulphur and phosphorus.....	2,093,936	1,035,151	2,163,412
Sulphuric acid.....	208,288	38,759	22,664
Tar, coal, and pine.....	256,372	236,216	256,740
Tin and manufactures of (including tinware).....	4,204,532	3,454,995	4,627,732
Whiting and prepared chalk.....	270,197	283,323	533,012
Zinc and manufactures of.....	2,804,027	2,131,176	2,458,351
	350,610,946	326,486,755	482,060,739

Summary of Imports

	1917		1918		1919		1920	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Brass and mfgs.....	.....	\$ 5,328,659	.....	\$ 4,670,140	.....	\$ 4,257,738	.....	\$ 6,337,775
Coal.....	20,857,460	70,562,357	.....	71,650,584	.....	61,160,799	18,772,542	98,032,598
Coke.....	970,106	6,517,260	21,678,587	8,975,445	17,308,837	2,405,740	586,406	6,458,596
Copper and mfgs.....	.....	10,015,561	1,165,590	6,372,412	383,374	7,147,783	.....	10,836,206
Iron ore.....	2,251,397	5,124,889	2,200,838	5,895,974	1,783,098	4,706,440	.....	5,812,912
Iron and steel mfgs.....	.....	187,191,534	.....	178,340,779	.....	178,210,710	1,938,943	249,632,055
Lead and mfgs.....	.....	1,732,428	.....	1,350,689	.....	1,022,265	.....	3,008,958
Petroleum and mfgs.....	.....	22,741,827	420,733,643	30,477,543	451,303,731	29,394,190	491,372,140	46,861,638
Structural materials.....	379,148,415	7,901,398	.....	8,117,394	.....	6,691,291	.....	11,338,831
Tin and mfgs.....	.....	5,656,665	.....	4,204,532	.....	3,454,945	.....	4,627,732
Zinc and mfgs.....	.....	3,641,272	.....	2,804,027	.....	2,131,176	.....	2,458,351
All other.....	.....	27,899,701	.....	27,751,427	.....	25,885,628	.....	36,654,087
Total.....	.....	354,313,551	.....	350,610,946	.....	326,468,755	.....	482,060,739

PRODUCTION BY PROVINCES

Summaries of the mineral production by provinces in 1920 and 1919 are shown in the accompanying tables. The first shows the total production in the several provinces and the percentages of each for the past three years.

In comparing the relative production of the various provinces it should be remembered that Nova Scotia is not credited with the large production of pig-iron and steel at Sydney and Sydney Mines, which is made almost entirely from imported iron ores and is not naturally credited as Canadian mine product. Similarly a large proportion of the pig-iron production in Ontario is excluded from the total value, because it is derived from imported ores. The province of Quebec, also, is not credited with the production of aluminium at Shawinigan Falls, which is made from imported bauxite.

Mineral Production by Provinces, 1918, 1919, and 1920

Province	1918		1919		1920	
	Value of production	Per cent of total	Value of production	Per cent of total	Value of production	Per cent of total
	\$		\$		\$	
Nova Scotia.....	22,317,108	10.56	23,445,215	13.27	34,130,017	14.98
New Brunswick.....	2,144,017	1.01	1,770,945	1.00	2,491,787	1.09
Quebec.....	19,605,347	9.28	21,267,947	12.04	28,886,214	12.68
Ontario.....	94,694,093	44.82	67,917,998	38.44	81,715,808	35.86
Manitoba.....	3,120,600	1.53	2,868,378	1.62	4,223,461	1.85
Saskatchewan.....	1,019,981	0.48	1,521,964	0.86	1,837,468	0.81
Alberta.....	23,109,987	10.94	21,087,582	11.94	33,586,456	14.74
British Columbia.....	42,935,333	20.27	34,865,427	19.73	39,411,728	17.30
Yukon.....	2,355,631	1.11	1,940,934	1.10	1,576,726	0.69
Dominion.....	211,301,897	100.00	176,686,390	100.00	227,859,665	100.00

Mineral Production of Nova Scotia, 1919 and 1920

Product	1919		1920	
	Quantity	Value	Quantity	Value
		\$		\$
Barytes..... Tons.	468	8,154	751	22,983
Coal..... "	5,720,373	22,078,726	6,429,291	32,238,129
Grindstones..... "	283	9,000	211	8,440
Gold..... Ozs.	850	17,571	690	14,263
Gypsum..... Tons.	163,852	250,174	260,661	573,752
Manganese..... "	45	3,600	62	4,140
Tripolite..... "	565	11,300	260	8,600
Clay products.....		432,900		541,114
Lime..... Bus.	366,543	73,309	201,500	40,300
Salt..... Tons.	174	2,188	3,023	32,000
Stone.....		413,194		420,175
Other products.....		145,099		226,121
Total.....		23,445,215		34,130,017

The total production of blast furnace pig-iron in Nova Scotia in 1919 was 285,087 tons valued at \$7,141,641 and in 1920, 332,493 tons valued at \$7,687,614.

Mineral Production of New Brunswick, 1919 and 1920

Product	1919		1920	
	Quantity	Value	Quantity	Value
		\$		\$
Coal.....Tons.	179,108	794,761	166,048	1,055,286
Grindstones....."	1,737	51,516	2,233	79,696
Gypsum....."	42,409	315,656	49,405	428,183
Natural gas.....M. cu. ft.	682,890	120,510	682,502	130,506
Petroleum.....Bls.	4,225	13,141	5,148	19,963
Clay products.....		52,941		73,484
Lime.....Bus.	468,533	223,193	701,859	365,030
Stone.....		125,294		280,167
Other products.....		73,933		59,472
Total.....		1,770,945		2,491,787

Mineral Production* of Quebec, 1919 and 1920

Product	1919		1920	
	Quantity	Value	Quantity	Value
		\$		\$
Copper.....Lbs.	2,691,695	503,105	880,638	153,724
Gold.....Ozs.	1,470	30,388	955	19,742
Iron ore, sold for export.....Tons.	321	1,005	960	3,000
Lead.....Lbs.	2,280,000	158,825	905,472	80,949
Molybdenite....."	83,002	69,203		
Silver.....Ozs.	140,926	156,600	61,003	61,552
Zinc.....Lbs.	1,752,000	128,562	1,120,200	85,931
Asbestos and asbestic.....Tons.	159,236	10,975,369	199,573	14,792,201
Chromite....."	8,541	228,898	11,016	251,379
Feldspar....."	925	13,073	649	10,052
Graphite....."	20	400	233	31,913
Magnesite....."	11,273	328,465	18,378	512,756
Mica....."		218,437		281,460
Mineral water.....Gals.		13,257	24,219	10,109
Iron oxides.....Tons.	11,862	113,427	19,128	157,909
Peat....."	486	4,811		
Phosphate....."	22	300		
Pyrites....."	52,746	203,222	14,817	44,451
Quartz....."	2,221	7,773	1,986	5,558
Talc....."			150	1,050
Cement.....Bls.	2,260,422	4,340,010	3,013,463	6,545,054
Clay products.....		1,563,832		2,361,007
Kaolin.....Tons.	759	13,744	683	15,022
Lime.....Bus.	1,796,822	493,762	2,108,203	826,044
Slate.....Squares.	1,632	10,853	(a)	14,200
Stone.....		1,441,919		2,189,325
Other products.....		248,707		431,826
Total.....		21,267,947		28,886,214

*There is also in this Province an important production of aluminium from imported ores.

(a) 1,532 squares, and 240 tons of crushed material.

Mineral Production of Ontario, 1919 and 1920

Product	1919		1920	
	Quantity	Value	Quantity	Value
		\$		\$
Cobalt, metallic and in oxide, etc. Lbs.	530,371	1,325,928	546,023	1,365,058
Copper..... "	24,346,623	4,550,627	32,059,993	5,596,392
Gold..... Ozs.	505,739	10,454,553	564,995	11,679,483
Iron ore, sold for export..... Tons.	5,562	45,520	6,683	54,266
Iron, pig, from Canadian ore (a)..... "	38,457	899,406	75,869	2,066,997
Lead..... Lbs.	1,487,586	103,625	2,255,520	201,643
Nickel..... "	44,544,883	17,817,953	61,335,706	24,534,282
Platinum..... Crude oz.	25	1,447	578	36,961
Palladium..... "	62	3,534	913	58,392
Rhodium, ruthium, osmium, etc. "			513	31,815
Silver..... Ozs.	12,117,878	13,465,628	9,907,626	9,996,795
Zinc..... Lbs.	147,692	10,838	13,950	1,070
Actinolite..... Tons.	80	880	100	1,160
Arsenious oxide..... "	2,859	488,706	1,831	425,617
Corundum..... "			196	24,547
Feldspar..... "	13,754	73,158	37,224	270,843
Fluorspar..... "	3,425	59,281	3,758	68,475
Graphite..... "	1,340	99,821	1,957	133,704
Gypsum..... "	58,899	278,120	74,707	404,162
Mica..... "	325	55,351	1,466	94,562
Mineral water..... "		55,958		14,473
Natural gas..... M. cu ft.	11,024,041	2,690,400	10,529,374	2,920,731
Peat..... Tons.	500	1,750	4,550	18,650
Petroleum..... Bls.	219,804	625,342	180,071	726,286
Phosphate..... Tons.	2	31		
Pyrites..... "	117,011	285,832	148,652	618,283
Quartz..... "	60,055	179,549	90,433	321,063
Salt..... "	148,112	1,395,291	206,832	1,512,724
Strontium..... "	48	336	75	2,625
Talc..... "	18,542	115,795	21,411	162,784
Cement..... Bls.	2,023,280	3,650,585	2,035,594	4,377,814
Clay products..... "		4,574,796		5,613,488
Lime..... Bus.	3,578,834	1,143,973	5,109,635	1,962,086
Sand-lime brick..... No.	24,141,399	335,200	30,664,720	451,175
Stone..... "		1,936,268		4,035,478
Other products..... "		1,192,516		1,931,924
Total.....		67,917,998		81,715,808

(a) The total production of blast-furnace pig-iron in Ontario in 1919 was 624,993 tons, valued at \$17,104,151; and in 1920, 749,068 tons, valued at \$22,252,062.

Mineral Production of Manitoba, 1919 and 1920

Product	1919		1920	
	Quantity	Value	Quantity	Value
		\$		\$
Copper..... Lbs.	3,348,000	625,775	3,062,577	534,604
Gold..... Ozs.	724	14,966	781	16,145
Silver..... "	20,760	23,069	15,510	15,649
Gypsum, calcined..... Tons.	32,903	371,337	44,371	487,894
Natural gas..... M. cu ft.			200	60
Clay products..... "		131,737		206,764
Lime..... Bus.	476,452	147,131	605,399	210,984
Sand-lime brick..... No.	7,389,300	124,847	10,278,802	197,734
Stone..... "		89,067		374,286
Other products..... "		1,340,449		2,179,341
Total.....		2,868,378		4,223,461

Mineral Production of Ontario, 1919 and 1920

Product	1919		1920	
	Quantity	Value	Quantity	Value
Coal..... Tons.	380,169	\$ 820,522	343,475	\$ 819,320
Magnesium sulphate..... "			2	103
Sodium sulphate..... "	15	450	811	19,496
Clay products.....		270,989		471,448
Sand-lime brick..... No.	1,294,000	14,601	2,258,500	35,383
Other products.....		415,402		491,718
Total.....		1,521,964		1,837,468

Mineral Production of Alberta, 1919 and 1920

Product	1919		1920	
	Quantity	Value	Quantity	Value
Gold, alluvial..... Ozs.	24	\$ 500		\$
Coal..... Tons.	4,964,535	18,294,495	6,833,500	29,849,608
Natural gas..... M. cu ft.	8,230,838	1,365,127	5,633,442	1,181,345
Petroleum..... Brl.	16,437	97,841	11,032	75,986
Clay products.....		571,949		786,430
Lime..... Bush.	109,067	41,276	139,433	72,477
Sand-lime brick..... No.	729,000	10,206	2,257,000	40,626
Stone.....		3,189		4,415
Other products.....		702,999		1,575,569
Total.....		21,087,582		33,586,456

Mineral Production of British Columbia, 1919 and 1920

Product	1919		1920	
	Quantity	Value	Quantity	Value
		\$		\$
Copper (a)..... Lbs.	44,502,079	8,317,884	45,319,771	7,911,019
Gold..... Ozs.	167,252	3,457,406	124,808	2,580,010
Iron ore sold for export..... Tons.			1,212	7,272
Lead..... Lbs.	40,060,113	2,790,587	32,792,725	2,931,670
Platinum..... Ozs.	25	2,150	17	719
Silver..... "	3,713,537	4,126,556	3,327,028	3,356,971
Zinc..... Lbs.	30,295,015	2,223,048	38,729,762	2,970,960
Arsenic..... Tons.	530	21,218	628	22,231
Coal..... "	2,435,933	12,420,445	2,858,877	16,726,950
Fluorspar..... "	1,638	38,556	7,477	171,971
Manganese..... "	616	10,559	587	6,889
Magnesium sulphate..... "	738	9,115	1,945	39,783
Mineral water.....		1,800		
Pyrites..... Tons.	6,730	33,650	11,275	56,376
Quartz..... "	32,715	340,313	35,876	141,200
Talc..... "	100	500	110	3,100
Clay products.....		293,478		596,172
Lime..... Bush.	351,253	187,963	561,305	341,632
Stone.....		217,006		276,505
Other products.....		373,193		1,270,298
Total.....		34,865,427		39,411,728

(a) Smelter recoveries of copper.

Mineral Production of Yukon, 1919 and 1920

Product	1919		1920	
	Quantity	Value	Quantity	Value
		\$		\$
Copper..... Lbs.	165,184	30,874	277,712	48,478
Gold..... Ozs.	90,705	1,875,039	72,778	1,504,455
Silver..... "	27,556	30,621	19,190	19,363
Coal..... Tons.	1,100	4,400	763	4,430
Total.....		1,940,934		1,576,726

Mineral Production by Provinces, 1899-1920

Calendar Year	Nova Scotia*	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Yukon	British Columbia	Total
1899	\$ 6,817, 274	\$ 420, 227	\$ 2, 585, 635	\$ 9, 819, 557	\$ 898, 775	\$ 553, 251	\$ 17, 108, 707		\$12, 482, 605	\$49, 234, 005
1900	9, 298, 479	439, 080	3, 292, 383	11, 258, 099	584, 374	413, 212	23, 452, 830		16, 680, 526	64, 420, 877
1901	7, 770, 159	467, 985	3, 759, 984	13, 970, 010	1, 193, 377	456, 246	19, 297, 940		20, 531, 833	65, 797, 911
1902	10, 686, 549	607, 139	3, 743, 636	14, 619, 091	1, 500, 359	498, 122	16, 127, 400		17, 448, 031	63, 231, 836
1903	11, 431, 914	580, 495	3, 585, 938	14, 160, 033	1, 791, 772	636, 706	14, 082, 986		17, 899, 147	61, 740, 513
1904	11, 212, 746	559, 913	3, 688, 482	12, 582, 843	2, 463, 074	1, 165, 642	12, 713, 613		19, 325, 174	60, 082, 771
1905	11, 507, 047	559, 035	4, 405, 975	18, 833, 292			11, 387, 642		22, 386, 008	69, 078, 999
1906	12, 894, 303	646, 328	5, 242, 058	25, 111, 682			10, 092, 726		25, 299, 600	79, 286, 697
1907	14, 532, 040	664, 467	6, 205, 553	30, 381, 658	\$ 898, 775	\$ 553, 251	\$ 4, 657, 524	\$ 3, 335, 898	25, 656, 056	86, 865, 202
1908	14, 487, 108	579, 816	6, 372, 949	30, 623, 812	584, 374	413, 212	5, 122, 505	3, 669, 290	23, 704, 035	85, 557, 101
1909	12, 504, 810	657, 035	7, 086, 265	37, 374, 577	1, 193, 377	456, 246	6, 047, 447	4, 032, 678	22, 479, 006	91, 831, 441
1910	14, 195, 730	581, 942	8, 270, 136	43, 538, 078	1, 500, 359	498, 122	8, 996, 210	4, 764, 474	24, 478, 572	106, 823, 623
1911	15, 409, 397	612, 830	9, 304, 717	42, 796, 162	1, 791, 772	636, 706	6, 662, 673	4, 707, 432	21, 299, 305	103, 220, 994
1912	18, 922, 236	771, 004	11, 656, 998	51, 985, 876	2, 463, 074	1, 165, 642	12, 073, 589	5, 933, 242	30, 076, 635	135, 048, 200
1913	19, 376, 183	1, 102, 613	13, 475, 534	59, 167, 749	2, 214, 496	881, 142	15, 054, 046	6, 276, 737	28, 086, 312	145, 634, 812
1914	17, 584, 639	1, 014, 570	11, 836, 929	53, 034, 677	2, 413, 489	712, 313	12, 684, 234	5, 418, 185	24, 164, 039	128, 863, 075
1915	18, 088, 342	903, 467	11, 619, 275	61, 071, 287	1, 318, 387	451, 933	9, 909, 347	5, 057, 708	28, 689, 425	137, 109, 171
1916	20, 042, 262	1, 118, 187	14, 406, 598	80, 461, 323	1, 823, 576	580, 473	13, 297, 543	5, 491, 610	39, 969, 962	177, 201, 534
1917	21, 104, 542	1, 435, 024	17, 400, 077	89, 066, 600	2, 628, 264	800, 651	16, 527, 535	4, 482, 202	36, 141, 926	189, 646, 821
1918	22, 317, 108	2, 144, 017	19, 603, 347	94, 694, 093	3, 120, 600	1, 019, 781	23, 109, 987	2, 336, 631	42, 835, 353	211, 301, 897
1919	23, 445, 215	1, 770, 945	21, 267, 947	67, 917, 998	2, 868, 378	1, 521, 964	21, 087, 582	1, 940, 934	34, 865, 427	176, 686, 390
1920	34, 130, 017	2, 491, 787	28, 886, 214	81, 715, 808	4, 223, 461	1, 837, 468	33, 586, 456	1, 576, 726	39, 411, 728	227, 859, 665

*Includes a small production from Prince Edward Island.

MINE PRODUCTION

The statistics of mineral production presented in the preceding tables are based, as already explained, in so far as metalliferous ores are concerned, on the actual, or probable recovery of refined metals from the ores treated. An endeavour has been made to compile another series of records eliminating as far as possible the metallurgical operations, and to include only the actual quantities of ores or concentrates shipped from mines and the net value of the same. It has not been found feasible, however, to eliminate entirely the metallurgical operations in certain cases, such as the recovery of bullion in placer operations, the recovery of gold bullion from milling ores and of silver bullion by those plants carrying on milling operations as well as mining, there being no commercial basis on which a separation of values could be made.

A record of mine production compiled on this basis is shown in the following tables, and includes a record of the tonnage and value of ores, or minerals mined, treated and shipped, the quantities of metals contained in ores shipped and records of labour employed and wages paid. It should be noted that these records cover only active shipping mines and do not include any record of the labour employed in the smelting and refining of ores, nor in blast furnace operations, with the exceptions noted. Previous to 1917 no record was obtained of the labour employed in connexion with the production of petroleum, and similar returns in respect to placer mining were not sufficiently complete to be included in the tables. The values of the ores given are in general those furnished by the operators. In certain cases, however, where such values have not been furnished, estimates have been made.

The tables showing the quantities of metals contained in the ores shipped give the total quantities of metals contained without any deductions or allowances being made for smelter or treatment losses.

Mine Production, 1915

	No. of mines or works	Men employed		Wages paid	Ores or minerals mined	Metals, ores, con- centrates or minerals shipped	Net value of shipments
		Under- ground	Surface				
METALLIFEROUS ORES	No.	No.		\$	Tons	Tons	\$
Antimony ore.....	7	157		55,038	15,318	1,491	83,971
Molybdenite.....	4	52		16,990		37	28,450
Iron ores.....	5	399		230,346	251,742	398,112	774,427
Milling gold ores—							
Bullion shipped.....	50	1,324	1,555	2,893,187	1,180,477	18	8,953,130
Concentrates.....						8,335	711,947
Silver-cobalt ores—							
Mine bullion shipped.....	25	1,008	1,531	2,363,414	588,404	232	3,410,936
Ore and concentrates.....						61,362	8,326,776
Nickel-copper ores.....	9	857	1,745	2,202,536	1,364,048	1,372,724	10,552,673
Copper ores.....	6	173	205	215,065	141,758	142,121	1,026,562
Silver-lead and zinc ores.....	66	328	784	960,894	215,694	73,752	2,958,394
Zinc.....						14,895	540,022
Gold-copper-silver ores.....	33	886	1,694	2,868,449	2,380,709	2,186,646	10,947,059
Placer mining—							
Yukon.....						9	4,776,145
British Columbia.....							770,000
Alberta.....							4,026
Total metalliferous.....	205	12,698		11,805,919	6,138,150	4,259,734	53,864,518
Total non-metalliferous.....	472	30,392		20,257,126	16,594,889	14,481,882	43,373,571
Total structural materials.....	943	13,786		5,657,717			17,920,759
	1,618	56,876		37,720,762			115,158,848

Content of Shipments

	Gold	Silver	Nickel	Copper	Lead	Zinc	Antimony
	Ozs.	Ozs.	Tons	Tons	Tons	Tons	Tons
Antimony ore.....							540
Milling gold ores—							
Bullion.....	430,981	87,116					
Concentrates.....	35,779	37,507					
Silver-cobalt ores—							
Mine bullion shipped.....		6,752,183					
Ore and concentrates.....		17,603,943					
Nickel-copper ores.....			43,891	23,318			
Copper ore.....	1,151	64,965		3,538			
Silver-lead-zinc ores—							
Lead ore and concentrate...	459	2,637,444			24,354		
Zinc ore and concentrate...		316,731				6,116	
Gold-copper-silver ores.....	202,127	849,784		34,758			
Placer mining—							
Yukon.....	229,803	25,689					
British Columbia.....	37,249						
Alberta.....	195						
Total.....	937,744	28,375,362	43,891	61,614	24,354	6,116	540

Mine Production, 1916

	No. of mines or works	Men employed		Wages paid	Ores or minerals mined	Metals, ores, concentrates or minerals shipped	Net value of shipments
		Under-ground	Surface				
METALLIFEROUS ORES	No.	No.		\$	Tons	Tons	\$
Antimony ore.....	5	116		59,957	14,947	(a) 938	136,360
Molybdenite.....	9	262		122,072	13,522	(b) 78	156,461
Iron ores.....	4	530		376,716	331,822	275,176	715,107
Milling gold ores—							
Bullion shipped.....	49	1,304	1,709	3,540,899	1,502,336	21	10,418,052
Concentrates.....						9,340	522,409
Silver-cobalt ores—							
Mine bullion shipped.....	32	1,034	1,561	2,450,614	574,882	171	3,444,736
Ore and concentrates.....						77,453	9,736,490
Nickel-copper ores.....	6	875	1,837	2,824,818	1,566,333	1,566,333	11,766,201
Copper ores.....	12	232	261	293,115	170,666	155,999	1,444,676
Silver-lead and zinc ores.....	84	573	1,070	1,803,633	395,802	84,516	4,568,500
Zinc.....						82,077	1,036,249
Gold-copper-silver ores.....	59	1,259	1,975	4,395,924	2,907,344	2,431,930	18,544,772
Placer mining—							
Yukon.....						9	4,413,958
British Columbia.....							580,500
Alberta.....							1,695
Total metalliferous.....	260	14,598		15,867,748	7,450,654	4,684,041	67,536,166
Total non-metalliferous.....	532	30,541		24,987,562	18,170,207	15,699,830	53,414,983
Total structural materials.....	816	12,465		6,237,168			17,467,186
Total.....	1,608	57,604		47,092,478			138,418,331

(a) Includes refined antimony.

(b) MoS₂ contents of concentrates produced.

Content of Shipments

	Gold	Silver	Nickel	Copper	Lead	Zinc	Antimony
	Ozs.	Ozs.	Tons	Tons	Tons	Tons	Tons
Antimony ore.....							429
Milling gold ores—							
Bullion.....	519,202	102,349					
Concentrates.....	30,138	54,136					
Silver-cobalt ores—							
Mine bullion shipped.....		4,982,702					
Ore and concentrates.....		15,690,716					
Nickel-copper ores.....			51,127	25,266			
Copper ores.....	713	65,438		4,638			
Silver-lead-zinc ores.....	784	2,582,952			27,062		
Zinc products.....		363,262				24,249	
Gold-copper-silver ores.....	163,466	905,685		42,126			
Placer mining—							
Yukon.....	211,010	47,703					
British Columbia.....	28,082						
Alberta.....	82						
Total.....	954,477	24,794,943	51,127	72,030	27,062	24,249	429

Mine Production, 1917

	No. of mines or works	Men employed		Wages paid	Ores or minerals mined	Metals, ores, concentrates or minerals shipped	Net value of shipments
		Under-ground	Surface				
METALLIFEROUS ORES	No.	No.	No.	\$	Tons	Tons	\$
Antimony ore.....	1	46		35,739	8,182	361	22,000
Molybdenite.....	23	501		260,692	26,871	1,554	320,006
Iron ores.....	9	528		509,163	305,330	215,302	758,621
Milling gold ores—							
Bullion shipped.....	45	1,388	1,633	3,687,392	1,303,410	18	9,312,424
Concentrates.....						8,874	365,375
Silver-cobalt ores—							
Mine bullion shipped.....	32	1,079	1,369	2,667,607	527,850	318	7,628,740
Ore and concentrates.....						72,719	10,123,838
Nickel-copper ores.....	6	907	1,737	2,981,896	1,518,783	1,509,841	11,323,808
Silver-lead-zinc ores—							
Lead ore and concentrate.....	87	716	1,198	2,295,090	445,663	46,799	3,866,862
Zinc ore and concentrate.....						116,489	1,323,985
Gold-copper-silver ores.....	83	1,730	2,253	4,667,578	2,554,738	1,878,911	16,048,186
Placer mining—							
Yukon.....	69	890		1,337,063		8	3,310,268
British Columbia.....	34	275		208,589			496,000
Total metalliferous.....	389	16,250		18,650,809	6,690,827	3,851,194	64,900,113
Total non-metalliferous.....	763	32,088		31,398,570	18,438,815	15,468,048	63,354,363
Total structural materials.....	739	10,814		6,609,872			19,837,311
	1,891	59,152		56,659,251	25,129,642	19,319,242	148,091,787

Content of Shipments

	Gold	Silver	Nickel	Copper	Lead	Zinc	Anti-mony	Molybdenite
	Ozs.	Ozs.	Tons	Tons	Tons	Tons	Tons	Tons
Antimony ore.....							144	
Molybdenum ore.....								165
Milling gold ores—								
Bullion.....	447,373	77,250						
Concentrates.....	21,905	99,119						
Silver-cobalt ores—								
Mine bullion shipped.....		9,248,717						
Ore and concentrates.....		12,042,990						
Nickel-copper ores.....			52,587	24,521				
Gold-copper-silver ores.....	77,599	782,521		40,479				
Silver-lead-zinc ores—								
Lead ore and concentrate.....	1,033	1,670,064			19,348			
Zinc ore and concentrate.....		465,153				32,328		
Placer mining—								
Yukon.....	176,548	39,723						
British Columbia.....	23,994							
Alberta.....								
Total.....	748,452	24,425,537	52,587	65,000	19,348	32,328	144	165

Mine Production, 1918

	No. of mines or works	Men employed		Wages paid	Ores or minerals mined	Metals, ores con- cet rates or minerals shipped	Net value of shipments
		Under-ground	Surface				
METALLIFEROUS ORES	No.	No.	No.	\$	Tons.	Tons.	\$
Molybdenum ore.....	18	196	110	274,945	34,030	461	428,997
Iron ore.....	11	624		693,383	254,424	211,608	885,893
Gold ores—							
Bullion shipped.....	{ 45	1,238	1,541	3,249,578	974,977	{ 18	9,173,037
Concentrates.....						{ 15,112	411,090
Silver-cobalt ores—							
Mine bullion shipped.....	{ 30	1,044	1,143	2,918,474	521,472	{ 228	6,821,528
Ore and concentrates.....						{ 73,646	9,763,737
Nickel-copper ores.....	6	975	1,449	3,186,909	1,641,617	1,641,617	12,312,123
Copper-gold-silver ores.....	46	1,125	1,723	4,296,649	2,665,548	1,856,899	11,658,397
Silver-lead-zinc ore—							
Lead ore and concentrate.....	{ 83	647	1,044	1,980,351	428,066	{ 75,256	4,705,573
Zinc “ “.....						{ 121,200	1,228,195
Placer mining—							
Yukon.....	65	478		878,858		4.5	1,907,702
British Columbia.....	22	128		134,092		0.5	320,000
Alberta.....							558
Total metalliferous.....	326	13,475		17,613,239	6,520,134	3,995,050	59,616,745
“ non-metalliferous.....	787	32,848		39,322,157	19,107,261	16,237,486	77,621,946
“ structural.....	643	9,504		6,989,496			19,130,799
Grand total.....	1,756	55,827		63,924,892	25,627,395	20,232,536	156,369,490

Content of Shipments

	Gold	Silver	Nickel	Copper	Lead	Zinc	Molybdenite
	Oz.	Oz.	Tons	Tons	Tons	Tons	Tons
Molybdenum ore.....							139
Gold ores—							
Bullion.....	441,120	75,176					
Concentrates.....	17,108	118,785					
Silver-cobalt ores—							
Mine bullion shipped.....		6,675,863					
Ore and concentrates.....		9,599,621					
Nickel-copper ores.....			56,980	27,688			
Copper-gold-silver ores.....	128,235	811,912		23,376			
Silver-lead-zinc ores—							
Lead ore and concentrate...	1,479	2,314,542			23,422		
Zinc “ “.....	97	431,888				31,513	
Placer mining—							
Yukon.....	101,744	22,892					
British Columbia.....	15,480						
Alberta.....	27						
Total.....	705,290	20,050,679	56,980	51,064	23,422	31,513	139

Mine Production, 1919

	No. of mines or works	Men employed		Wages paid	Ores or minerals mined	Metals, ores, concentrates or minerals shipped	Net value of shipments
		Under-ground	Surface				
METALLIFEROUS ORES	No.	No.	No.	\$	Tons	Tons	\$
Molybdenum ore.....	1	25	80	35,536	7,280	46	69,203
Iron ore.....	5	556		649,517	289,991	195,970	687,386
Gold ores—							
Bullion shipped.....	{ 28	1,042	1,479	3,506,442	1,212,760	{ 29	10,972,559
Concentrates.....	{					{ 5,229	298,222
Silver-cobalt ores—							
Mine bullion shipped.....	{ 35	922	1,095	2,556,767	444,471	{ 179	4,868,543
Ore and concentrates.....	{					{ 62,045	7,096,775
Nickel-copper ores.....	7	432	590	1,244,713	572,400	572,400	4,579,200
Copper-gold-silver ores.....	30	951	1,250	3,191,524	1,779,956	1,085,950	9,265,569
Silver-lead-zinc ore—							
Lead ore and concentrate.....	{ 67	615	1,000	1,884,338	409,959	{ 54,508	3,044,839
Zinc “ “.....	{					{ 135,535	1,049,493
Placer mining—							
Yukon.....	70	382		684,159		4 $\frac{1}{2}$	1,701,514
British Columbia.....	23	116		93,732		$\frac{3}{2}$	288,650
Alberta.....							500
Total metalliferous.....	266	10,535		13,846,728	4,716,817	2,111,896	43,922,453
“ non-metalliferous.....	733	34,422		41,674,932	18,047,064	14,641,415	76,002,087
“ structural.....	654	12,270		9,304,045			27,421,510
Grand total.....	1,653	57,227		64,825,705	22,763,881	16,753,311	147,346,050

Content of Shipments

	Gold	Silver	Nickel	Copper	Lead	Zinc	Molybdenite
	Oz.	Oz.	Tons	Tons	Tons	Tons	Tons
Molybdenum ore.....							41 $\frac{1}{2}$
Gold ores—							
Bullion.....	529,409	94,327					
Concentrates.....	10,525	168,673					
Silver-cobalt ores—							
Mine bullion shipped.....		4,293,887					
Ore and concentrates.....		6,636,457					
Nickel-copper ores.....			19,356	10,807			
Copper-gold-silver ores.....	121,482	637,020		26,307			
Silver-lead-zinc ores—							
Lead ore and concentrate.....	1,623	2,185,376			16,074		
Zinc “ “.....	90	535,829				29,980	
Placer-mining—							
Yukon.....	87,923	19,783					
British Columbia.....	13,859						
Alberta.....	24						
Total.....	764,935	14,571,352	19,356	37,114	16,074	29,980	41 $\frac{1}{2}$

Mine Production 1920

	No. of mines or works	Men employed		Wages paid	Ores or minerals mined	Metals, ores, concentrates or minerals shipped	Net value of shipments
		Under-ground	Surface				
METALLIFEROUS ORES	No.	No.		\$	Tons	Tons	\$
Iron ores.....	3	404		566,110	195,870	127,614	509,315
Gold ores—							
Bullion shipped.....	{	31	1,195	4,089,526	1,300,316	27	12,088,474
Concentrates.....						8,456	187,635
Silver-cobalt ores—							
Mine bullion shipped.....	{	38	731	2,844,666	579,261	175½	5,247,809
Ore and concentrate.....						52,328	4,703,215
Nickel-copper ores.....	6	431	830	2,070,648	1,135,792	1,135,792	9,086,336
Copper-gold-silver ores.....	20	796	1,027	2,978,503	1,779,477	987,506	5,522,350
Silver-lead-zinc ores—							
Lead ore and concentrate.....	{	65	577	1,751,428	461,925	69,493	2,985,848
Zinc.....						249,136	1,157,844
Placer mining—							
Yukon.....	56	453		730,482		3	1,520,392
British Columbia.....	19	115		82,460		½	221,600
Total metalliferous.....	238	9,815		15,113,823	5,452,641	2,630,531	43,230,818
Total non-metalliferous.....	754	37,126		57,981,087	21,346,216	17,911,471	108,027,947
Total structural materials.....	665	13,902		15,036,618			41,892,088
	1,657	60,843		88,131,528	26,798,857	20,542,002	193,150,853

Content of Shipments

	Gold	Silver	Nickel	Copper	Lead	Zinc
	Oz.	Oz.	Tons	Tons	Tons	Tons
Milling gold ores—						
Bullion.....	581,555	100,550				
Concentrates.....	7,082	169,667				
Silver-cobalt ores—						
Mine bullion shipped.....		5,103,582				
Ore and concentrate.....		5,301,114				
Nickel-copper ores.....			39,156	19,017		
Copper-gold-silver ores.....	95,897	584,974		28,482		
Silver-lead-zinc ores—						
Lead ore and concentrate.....	1,745	2,228,560			18,163	
Zinc “ “.....	131	653,618				45,517
Placer mining—						
Yukon.....	72,750	16,369				
British Columbia.....	10,719					
Total.....	769,879	14,158,434	39,156	47,499	18,163	45,517

Labour and Wages Statistics Covering Non-Metalliferous Mines during 1918, 1919, and 1920

	1918			1919			1920		
	Number active mines or works	Number employed	Wages paid \$	Number active mines or works	Number employed	Wages paid \$	Number active mines or works	Number employed	Wages paid \$
NON-METALLIC									
Asbestos and asbestic.....	13	3,074	2,871,643	15	3,567	3,954,407	18	3,572	4,765,305
Chromite.....	13	223,375	223,375	5	138	164,036	4	143	170,041
Coal.....	381	25,419	32,899,501	370	27,198	34,826,363	369	29,387	49,171,238
Feldspar.....	12	143	108,592	12	98	46,870	20	277	152,379
Fluorspar.....	9	125	89,858	4	100	153,034	4	119	123,050
Graphite.....	5	413	121,885	4	121	72,098	5	128	112,168
Grindstones and scythestones.....	6	116	45,853	5	95	36,080	4	104	45,064
Gypsum.....	8	435	275,312	13	725	380,105	11	1,016	955,602
Magnesite.....	4	305	326,417	3	186	98,045	3	200	158,908
Mica and phosphate.....	16	185	84,521	21	147	109,411	20	186	145,247
Mineral pigments: barytes, and oxides.....	6	95	51,735	5	94	43,473	6	88	61,125
Mineral water.....	18	50	17,271	16	36	17,119	24	24	12,824
Natural gas.....	101	711	641,542	99	681	631,567	104	616	643,320
Petroleum.....	153	204	195,141	120	274	210,936	122 (a)	202	182,787
Pyrites (b).....	15	617	688,720	11	372	372,620	9	253	357,277
Quartz.....	11	236	319,840	4	111	121,183	11	179	181,257
Salt.....	9	302	286,781	11	329	350,141	12	345	472,031
All otherst.....	7	145	74,170	15	150	87,444	17	287	271,464
Total non-metallic.....	787	32,848	39,322,157	733	34,422	41,674,932	754	37,126	57,981,087
STRUCTURAL									
Cement.....	10	1,249	1,474,547	10	1,535	1,836,389	13	2,248	3,716,001
Clay products.....	230	3,423	2,131,614	221	4,613	3,356,464	224	5,232	5,071,645
Lime.....	65	741	664,367	58	868	829,459	58	1,069	1,314,186
Sand-lime brick.....	10	146	69,514	13	286	206,405	291	1,546	264,045
Sand and gravel.....	186	1,558	991,169	192	1,945	997,434	186	1,546	1,343,212
Slate.....	1	19	11,298	1	24	17,004	2	29	25,276
Stone.....	141	2,368	1,646,987	159	2,999	2,060,870	168	3,487	3,302,253
Total structural.....	643	9,504	6,989,496	654	12,270	9,304,045	665	13,902	15,036,618
Total non-metalliferous.....	1,429	42,352	46,311,653	1,387	46,692	50,978,977	1,419	51,028	73,017,705

†Includes in 1918—actinolite, corundum, magnesium sulphate, manganese, talc, and tripolite.
 “ 1919—actinolite, magnesium sulphate, manganese, peat, strontium, talc, and tripolite.
 “ 1920—actinolite, corundum, manganese, magnesium sulphate, sodium sulphate, peat, strontium, talc, and tripolite.
 (a) Not complete. (b) Partial.

METALLIC PRODUCTS

ALUMINIUM

No commercial ores of aluminium have as yet been found in Canada. Aluminium is, however, made in extensive works at Shawinigan Falls, Quebec, from imported ores by the Northern Aluminium Company.

The imports of alumina, including bauxite, were in 1920, 57,414.3 tons, valued at \$1,889,064, as against 29,302 tons, valued at \$1,565,264, in 1919.

The imports of aluminium in ingots, bars, tubes, etc., were, in 1920, 935.4 tons, valued at \$633,733, besides manufactures of aluminium valued at \$589,106, or a total of \$1,222,733, as against 379.5 tons, valued at \$247,565, and manufactures of aluminium valued at \$347,129, or a total of \$594,694 in 1919.

The exports of aluminium in ingots bars, tubes, etc., were, in 1920, 9,858 tons, valued at \$6,094,620, together with manufactures of aluminium valued at \$175,057, as against 7,288 tons, valued at \$4,455,031, and manufactures valued at \$59,339 in 1919.

There was little fluctuation in the price of aluminium during 1919 and 1920. The average price in New York in 1920 was 32.14 cents per pound.

ANTIMONY

Shipments of antimony ore and concentrate and of refined antimony were made intermittently during the last ten or twelve years. There has been no reported shipment of antimony in any form during the last three years, although the Customs Department report exports of ore amounting in 1919 to 56 tons, valued at \$3,420, and in 1918 to 26 tons, valued at \$1,430.

The imports of antimony as regulus, salts, etc., were, in 1920, 539.7 tons valued at \$97,288, as against 520.9 tons, valued at \$89,805, in 1919.

The price of antimony in New York was quoted around 11 cents per pound during the first four months of 1920. Then it started to decline gradually to an average of 5.53 cents for December. The average for the year was 8.49 cents per pound.

COBALT

The Cobalt district of Ontario has been for several years the principal source of the world's supply of cobalt. The cobalt ores and cobalt residues produced from the mines and the reduction plants of Cobalt area are shipped mostly to the south-eastern Ontario smelters. The recovery of the cobalt in these smelters is first in the form of cobalt oxide usually of three different grades. The oxide is partly marketed as such, and partly re-treated for the production of metallic cobalt, cobalt salts, and stellite.

The total production of cobalt contained in smelter products shipped and in cobalt residues exported amounted to 546,023 pounds, valued at \$1,365,058 (at \$2.50 per pound), as against 530,371 pounds, valued at \$1,325,928 (at \$2.50 per pound), in 1919.

The 1920 production included: (a) 166,375 pounds of metallic cobalt, valued at \$389,708; (b) 536,457 pounds of cobalt oxides, valued at \$1,170,288; and (c) 300 pounds of cobalt compounds, valued at \$600, making a total valuation of \$1,560,596.

The 1919 production included: (a) 113,943 pounds of metallic cobalt, valued at \$220,676; (b) 429,359 pounds of cobalt oxides, valued at \$611,909; (c) other cobalt

compounds, such as stellite and cobalt sulphate, amounting to 60,437 pounds, valued at \$34,308; and (d) cobalt ores and residues exported amounting to 842 tons, containing 93,143 pounds of cobalt and valued at \$133,294, making a total valuation of \$900,187.

The total amount of cobalt ores and residues treated in 1920 amounted to 8,988 tons with a cobalt content of 1,200,040 pounds, as against 9,084 tons with a cobalt content of 1,070,826 pounds, in 1919.

No price quotations for cobalt are available for the last three years but the metal produced in the refineries of Ontario is reported to have obtained a price of around \$2.50 per pound.

Summary of Cobalt Statistics

	1917	1918 (b)	1919	1920
Cobalt ores and residues treated..... Tons.	7,770	8,354	9,084	8,988
Cobalt content of ores and residues treated.... Lbs.	866,327	972,679	1,070,826	1,200,040
Cobalt recovery from smelter products..... { Lbs.	1,079,572	737,157	530,371	546,023
	Value.	\$1,727,315	\$1,842,893	\$1,325,928
Metallic cobalt produced..... { Lbs.	393,773	294,476	113,943	166,375
	Value.	\$616,633	\$713,072	\$220,676
Cobalt oxide produced..... { Lbs.	802,448	476,053	429,359	536,457
	Value.	\$1,104,500	\$760,121	\$611,909
Other cobalt compounds..... Value.	\$740,032	\$936,139	\$34,308	\$600

(b) The record of cobalt production for 1918 as published in the Annual Report for that year have been revised because of duplication caused by the inclusion of materials re-treated.

COPPER

The production of copper in 1920 amounted to 81,600,691 pounds, valued at \$14,244,217 (17.456 cents per pound), as against 75,053,581 pounds, valued at \$14,028,265 (18.691 cents per pound), in 1919.

The 1920 production included: (a) 31,481,884 pounds contained in blister copper partly exported and partly refined in Canada; (b) 32,000,079 pounds contained in nickel-copper matte, partly exported and partly refined in Canada; (c) 44,766 pounds contained in copper sulphate; and (d) 18,073,962 pounds, the estimated recoveries from ores and concentrates exported.

The 1919 production included: (a) 6,934,000 pounds of refined copper; (b) 23,167,024 pounds contained in blister copper exported for refining; (c) 24,197,382 pounds contained in nickel-copper matte, partly exported and partly refined in Canada; (d) 41,445 pounds contained in copper sulphate; and (e) 20,713,730 pounds, the estimated recoveries from ores and concentrates exported.

The production of refined copper in 1920 amounted to 2,590 tons, as against 3,467 tons in 1919; 3,809 tons in 1918; 3,901 tons in 1917, and 483 tons in 1916, the first year that refined copper was produced commercially in Canada.

There are now two companies producing refined copper in Canada; the Consolidated Mining and Smelting Company of Canada, Limited, which has been producing since 1916, and the British America Nickel Corporation, Limited, which started production early in 1920.

The production of copper by provinces was as follows: British Columbia contributed 55.5 per cent of the total; Ontario, 39.3 per cent; Quebec, 1.1 per cent; Manitoba 3.8 per cent, and the Yukon, 0.3 per cent.

The imports of copper in 1920 were valued at \$10,836,206 and included: (a) copper ore and concentrate, 1,220 tons, valued at \$57,640; (b) copper "old and scrap," 2,481,100 pounds, valued at \$404,161; (c) copper in pigs, ingots and blocks, 9,236,575 pounds, valued at \$1,784,370; (d) copper in bars and rods, 33,907,300 pounds, valued at \$6,408,717; (e) copper in strips, tubing, wire, precipitate, etc., 2,905,207 pounds, valued at \$998,461; (f) copper sulphate 2,365,535 pounds, valued at \$192,900, and (g) other manufactures of copper, valued at \$989,957.

The imports in 1919 were valued at \$7,147,783 and included: (a) copper ore, 1,648.6 tons, valued at \$78,983; (b) copper "old and scrap," 1,010,000 pounds, valued at \$138,023; (c) copper in pigs, ingots or blocks, 3,042,197 pounds, valued at \$659,214; (d) copper in bars and rods, 23,982,500 pounds, valued at \$4,971,310; (e) copper in strips, tubing, wire, precipitate, etc., 2,285,812 pounds, valued at \$694,842; (f) copper sulphate, 1,874,801 pounds, valued at \$150,388; and (g) other manufactures of copper, valued at \$455,023.

The exports of copper in 1920 were valued at \$15,877,306, and included: (a) copper in ore, matte, regulus, etc., 47,329,700 pounds, valued at \$5,918,782; (b) blister copper, 38,198,900 pounds, valued at \$710,978; (c) copper, black or coarse, and in pigs, etc., 2,666,500 pounds, valued at \$710,978; (d) copper "old and scrap," 774,400 pounds, valued at \$113,265; and (e) copper wire and cable, valued at \$433,097.

The exports of copper in 1919 were valued at \$14,654,640 and included: (a) copper in ore, matte, regulus, etc., 40,851,300 pounds, valued at \$5,316,151; (b) blister copper, 19,956,100 pounds, valued at \$3,747,355; (c) copper black or coarse and in pigs, etc., 18,192,300 pounds, valued at \$4,186,549; (d) copper "old and scrap," 3,117,000 pounds, valued at \$537,225; and (e) copper wire and cable, valued at \$867,360.

The price of copper remained fairly steady around 18 cents per pound until October when it dropped to 16 cents. The decline continued until the end of the year with copper at 13 cents per pound. The average for the year was 17.456 cents per pound.

Summary of Copper Statistics

		1917	1918	1919	1920
Ores and concentrates shipped (a).....	{ Tons.	1,878,911	1,856,899	1,085,950	987,506
	{ Value.	\$16,048,186	\$11,658,397	\$9,265,569	\$5,522,350
Copper production.....	{ Tons.	54,614	59,385	37,527	40,800
	{ Value.	\$29,687,989	\$29,250,536	\$14,028,265	\$14,244,217
Production by provinces:—					
Quebec.....	Lbs.	5,015,560	5,869,649	2,691,695	880,638
Ontario.....	"	42,867,774	47,074,475	24,346,623	32,059,993
Manitoba.....	"	(c) 1,152,960	2,339,751	3,348,000	3,062,577
British Columbia.....	"	57,730,959	62,865,681	44,502,079	45,319,771
Yukon.....	"	2,460,079	619,878	165,184	277,712
Imports of copper (b).....	{ Tons.	16,549	12,538	15,395	24,561
	{ Value.	\$10,015,561	\$6,373,361	\$7,147,783	\$10,836,206
Exports of copper.....	{ Tons.	59,961	60,536	41,058	44,485
	{ Value.	\$23,256,278	\$20,772,109	\$14,654,640	\$15,877,306

(a) Does not include the nickel-copper ores, but only the copper-gold-silver ores with also small shipments of copper ore. See Nickel.

(b) Includes manufactures of copper for which no quantities are given; in 1917, \$316,190; in 1918, \$253,579; in 1919, \$455,023; and in 1920, \$989,957; includes also copper ores in 1919, 1,685 tons valued at \$78,983, and in 1920, 1,220 tons valued at \$57,640.

(c) Includes in 1917 small quantities from New Brunswick and Alberta.

GOLD

The production of gold in 1920 amounted to 765,007 fine ounces, valued at \$15,814,098, as against 766,764 fine ounces, valued at \$15,850,423, in 1919.

The production in 1920 included: (a) alluvial gold, 83,469 ounces; (b) gold obtained from milling ore, 581,455 ounces; (c) gold obtained from ores and concentrates treated at Canadian copper and lead smelters, 45,886 ounces; and (d) the estimated gold recoveries from ores and concentrates exported, \$54,197 ounces.

The production in 1919 included: (a) alluvial gold, 104,495 ounces; (b) gold obtained from milling ore, 529,296 ounces; (c) gold obtained from ores and concentrates treated at the Canadian copper and lead smelters, 67,636 ounces, and (d) the estimated gold recoveries from ores and concentrates exported, 65,337 ounces.

There are two refineries producing fine gold in Canada, that of the Royal Mint at Ottawa, Ont., and that of the Consolidated Mining and Smelting Company of Canada, Limited, at Tadanae (near Trail), B.C.

The production of gold by provinces is as follows: Nova Scotia, 0.1 per cent of the total; Quebec, 0.1 per cent; Ontario, 73.9 per cent; Manitoba, 0.1 per cent; British Columbia, 16.3 per cent; and the Yukon, 9.5 per cent.

The imports in 1920 were: gold fringe, valued at \$36,919, and manufactures of gold and silver, valued at \$845,089.

The imports in 1919 were: gold fringe, valued at \$17,949, and manufactures of gold and silver, valued at \$459,463.

The exports of gold in the form of dust, nuggets, etc., in 1920 were valued at \$4,642,909, as against \$5,037,123 in 1919.

Summary of Gold Statistics

	1917	1918	1919	1920
Gold ores and concentrates shipped (a).....	Tons. 8,874	15,112	5,229	8,456
	Value. \$365,375	\$411,090	\$298,222	\$187,635
Gold bullion shipped from quartz mines.....	Tons. 18	18	29	27
	Value. \$9,312,424	\$9,173,037	\$10,972,559	\$12,088,474
Gold bullion shipped by placer operators.....	Tons. 7.0	5.0	4.0	3.5
	Value. \$3,806,268	\$2,228,260	\$1,990,664	\$1,741,992
Gold production (b).....	Fine ounces 738,831	699,681	766,764	765,007
	Value. \$15,272,992	\$14,463,689	\$15,850,423	\$15,814,098
Production by provinces:—				
Nova Scotia.....	Ozs. 2,210	1,196	850	690
Quebec.....	" 1,511	1,939	1,470	955
Ontario.....	" 423,261	411,976	505,739	564,995
Manitoba.....	" 440	1,926	724	781
Alberta.....	"	27	24	.....
British Columbia.....	" 133,742	180,163	167,252	124,808
Yukon.....	" 177,667	102,474	90,705	72,778
Imports of gold.....	Value. \$14,601,931	\$1,831,795	\$477,412	\$882,008
Exports of gold.....	" \$15,929,051	\$10,040,813	\$5,037,123	\$4,642,909
Number of men employed.....	No. 4,186	3,485	3,019	3,094
Wages paid.....	\$4,233,044	\$4,262,528	\$4,284,333	\$4,902,468

(a) The greater portion of the gold ores are treated in the reduction plants, at the mines. Thus these figures of shipments represent only a small proportion of the output from the mines.

(b) Includes gold from gold milling ores, copper ores and lead-zinc ores.

IRON ORE

The shipments of iron ore from Canadian mines, which in 1919 were the lowest that had been recorded in nineteen years, have again fallen off in 1920 to 129,072 tons, valued at \$517,987, as compared with 197,160 tons valued at \$693,386, in the previous year, and were it not for the continued operations at the Magpie and Moose Mountain mines in Ontario, commercial production would practically cease.

The shipments in 1920 included 960 tons of titaniferous ore shipped from Baie St. Paul, on the north shore of the St. Lawrence; a little over 1,200 tons from Texada Island, B.C., shipped to Seattle, 4 cars of limonite shipped from Alta Lake, Mons, B.C., to the Vancouver Gas Works, and the balance from the Magpie and Moose Mountain mines.

The Magpie siderite mine, in the Michipicoten district of Ontario, was operated throughout the year by the Algoma Steel Corporation, the siderite ore being roasted as usual in the rotary kiln plant at the mine. About 118,990 short tons of roasted ore were shipped to the blast furnace plant at Sault Ste. Marie. The raw ore averages about 34.3 per cent and the roasted ore about 50 per cent metallic iron.

Messrs. Moose Mountain, Limited, operating at Sellwood, Ont., were actively engaged till the end of November, in the development of the milling and briquetting processes, which are being employed in the treatment of these low grade magnetites. The raw ore averages about 33.8 per cent iron, while the briquettes produced during 1920 averaged about 66 per cent iron. A large tonnage of raw ore was mined during the year but only a comparatively small quantity, 7,664 short tons of briquettes, were marketed.

In the Great Lakes region ore prices Lake Erie ports were from February 2, 1920: Old Range Bessemer, \$7.45 per gross ton (basis 55 per cent iron); Messabi Bessemer, \$7.20; Old Range Non-Bessemer, \$6.70 (basis 51.5 per cent iron); Messabi Non-Bessemer, \$6.55. During the season of 1919 the ruling prices were \$1 per ton less than these figures.

Of the total shipments in 1920 mine operators reported 8,855 tons as sold for export to the United States and 120,217 tons shipped to Canadian blast furnaces. The Customs Department records show exports of iron ores to the United States during the year of 19,879 tons, valued at \$99,179, and imports of iron ore amounting to 1,938,943 tons, valued at \$5,812,912.

The quantity of iron ore charged to blast furnaces in 1920 was 2,107,253 tons, of which 149,515 tons were of domestic origin and 1,957,738 tons imported. The imported ore included 621,370 tons of Newfoundland ore and 1,336,368 tons of ore from the United States. Shipments of iron ore from Wabana mines, Newfoundland, in 1920 by the two Canadian companies operating there were 651,304 short tons, of which 624,596 tons went to Nova Scotia and 36,708 tons to Great Britain and Europe, as against 499,972 tons in 1919, all of which went to Sydney and North Sydney in Cape Breton.

PIG-IRON

The total production of pig-iron in Canada in 1920, excluding the production of ferro-alloys, was 1,090,396 short tons (973,568 gross tons), having a value of \$30,319,-024, as compared with a total production in 1919 of 917,346 short tons (819,447 gross tons), valued at \$24,577,589, showing an increase of 172,615 tons, or 18.8 per cent. Of the 1920 total, 1,081,561 tons were made in blast furnaces and 8,835 tons were made in electric furnaces from scrap metal, chiefly shell turnings. In 1919 the blast furnace production was 910,080 tons, and the electric furnace production from scrap steel was 7,701 tons.

The production of blast furnace pig-iron in Nova Scotia in 1920 was 332,493 tons, as against 285,087 tons in 1919. In Ontario the production of blast furnace pig-iron was 749,068 tons, as against 624,993 tons in 1919.

By grades the 1920 production included: Basic, 740,598 tons; foundry and malleable, etc., 340,963 tons; low phosphorus iron (electric furnace), 8,835 tons. By grades the 1919 production included: Basic, 580,426 tons; Bessemer, 7,637 tons; foundry and malleable, etc., 322,017 tons; low phosphorus iron (electric furnace), 7,701 tons.

The blast furnace plants operated included those of the Dominion Iron and Steel Company at Sydney, N.S.; the Nova Scotia Steel and Coal Company at North Sydney; The Steel Company of Canada at Hamilton, Ont.; the Canadian Furnace Company at Port Colborne, Ont.; the Algoma Steel Corporation, Limited, at Sault Ste. Marie, Ont.; the Midland Iron and Steel Co., at Midland, Ont.

Electric furnaces were operated for the production of pig-iron from scrap at Hull, Shawinigan Falls, and Montreal, in Quebec, and at Orillia, in Ontario.

The production of ferro-alloys in Canada in 1920, including ferro-silicon, spiegeleisen and ferro-phosphorus, all with the exception of the spiegeleisen being made in electric furnaces, was about 28,173 tons, valued at \$1,432,153. In 1919 the production was 48,601 tons, valued at \$2,000,809.

The exports of pig-iron during 1920 were 102,628 tons, valued at \$3,628,657, or an average of \$35.25 per ton, and of ferro-alloys 25,422 tons, valued at \$1,297,720, or an average of \$51.04 per ton. The exports of pig-iron included 82,772 tons to the United States, 18,902 to the United Kingdom, and 954 tons to other countries. The ferro-alloy exports included 1,914 tons to the United Kingdom, 20,657 tons to the United States, and 2,831 tons to other countries.

The imports during 1920 included 57,483 tons of pig-iron, valued at \$2,383,442, or an average of \$41.46 per ton, and 7,908 tons of ferro-alloys, valued at \$1,324,061, or an average of \$167.43 per ton, making a total import of pig-iron and ferro-alloys of 65,391 tons, valued at \$3,707,503. The United States trade records show exports to Canada during 1920 of pig-iron and ferro-alloys amounting to 56,100 gross tons (62,832 short tons), valued at \$2,872,466.

STEEL

The total production of steel ingots and direct steel castings in 1920 was 1,232,697 short tons (1,100,622 long tons), of which 1,167,273 tons were ingots and 65,424 tons direct steel castings.

The total production of steel in 1919 was 1,030,342 short tons (919,948 long tons), of which 993,039 tons were ingots and 37,303 tons direct castings.

The 1920 production included: open-hearth steel, 1,192,145 tons; electric steel, 28,301 tons; crucible and converter steels, 12,251 tons.

The 1919 production included: open-hearth steel, 1,007,495 tons; electric steel, 15,502 tons; crucible and converter steels, 7,345 tons.

The total production of electric furnace steel in 1918 was 119,130 tons; in 1917, 50,467 tons, and in 1916, 19,639 tons.

The total production of pig-iron, ferro-alloys and steel in electric furnaces was 59,813 tons in 1920, as compared with 41,683 tons in 1919, 19,869 tons in 1918, and 101,031 tons in 1917.

The exports of steel during 1920 as per Customs Department records included: billets, blooms and ingots, 69,269 tons, valued at \$3,696,974, or an average of \$53.37 per ton; bars and rods, 85,166 tons, valued at \$5,687,611, or an average of \$86.82 per ton; steel rails, 61,117 tons, valued at \$2,676,933, or an average of \$43.80 per ton; wire and wire nails, valued at \$7,407,958; structural steel, 3,458 tons, valued at \$358,294, or an average of \$103.62 per ton; scrap iron and steel, 129,015 tons, valued at \$2,447,684, or an average of \$18.97 per ton, together with a large quantity of manufactured iron and steel goods.

The production of rolled iron and steel products in 1920 (including blooms, billets and axle blanks rolled for forging purposes and blooms, billets and slabs rolled for export sale), was 1,061,614 tons of which 73,970 tons were rolled iron and 987,644 tons rolled steel. The total production of rolled products included: steel rails, 255,322 short tons; plates and sheets, 78,565 short tons; wire rods, 216,883 short tons; merchant bars and structural shapes, 423,855 short tons; rolled blooms and billets for forging purposes and rolled blooms, billets or slabs sold for export, 86,989 tons.

The total production in 1919 of finished rolled products was 804,407 tons which included: steel rails, 316,304 tons; plates and sheets, 25,408 tons; wire rods, 153,723 tons; merchant bars and structural shapes, 205,643 tons; rolled blooms and billets for forging purposes and rolled blooms, billets, or slabs sold for export, 25,090 tons.

Summary of Iron and Steel Statistics, 1917-20

	1917	1918	1919	1920
Iron ore shipped from mines..... Short tons.	215,302	211,608	197,170	129,072
Canadian iron ore charged to blast furnaces..... "	92,065	96,745	78,391	149,515
Imported iron ore charged to blast furnaces..... "	2,084,231	2,146,995	1,674,194	1,957,738
Iron ore charged to steel furnaces..... "	39,793	48,599	32,409	64,146
Pig-iron made in blast furnaces..... "	1,156,789	1,163,520	910,080	1,081,561
" " elec. furnaces..... "	13,691	32,031	7,701	8,835
" exported..... "	12,081	2,130	63,605	102,628
" imported..... "	83,400	67,397	35,800	57,483
Ferro-alloys made..... "	43,465	44,704	48,601	28,173
" imported..... "	12,829	35,284	4,384	7,908
" exported..... "	33,212	23,781	22,449	25,422
Pig-iron and ferro-alloy consumption... "	1,264,870	1,316,025	932,349	1,181,228
" used in steel furnaces..... "	1,112,082	897,537	609,670	732,486
Steel ingots and castings made..... "	1,745,734	1,873,708	1,030,342	1,232,697
Steel rails made..... "	46,645	162,747	316,304	255,322
Can. coke used in iron blast furnaces... "	634,962	561,135	372,203	415,742
Imp. " " " " " " " " " " " "	723,657	861,522	689,548	788,795
Iron and steel imported..... "	929,776	786,151	738,175	1,092,612
No. of completed blast furnaces..... No.	15	20	17	15
No. of men employed in blast furnaces.. "	1,177	1,391	1,259	1,179
Wages paid in blast furnaces..... \$	1,546,374	1,941,500	2,017,880	2,186,779
Value of pig-iron produced..... \$	24,290,101	33,495,171	24,577,589	29,939,676
Value of iron and steel goods exported.. \$	46,791,681	61,772,613	81,578,461	84,357,906
Value of iron and steel goods imported.. \$	187,191,534	178,340,779	178,210,710	249,632,055

LEAD

The production of lead in 1920 amounted to 35,953,717 pounds, valued at \$3,214,262 (8.940 cents per pound), as against 43,827,699 pounds, valued at \$3,053,037 (6.966 cents per pound), in 1919.

The production in 1920 included: (a) 28,985,590 pounds of lead bullion produced at Tadanaac, B.C., and pig-lead produced at Galetta, Ont.; (b) 6,958,637 pounds, the estimated recoveries from lead ores exported; and (c) 9,490 pounds, the estimated recoveries from the gold and silver ores of Ontario also exported.

The production in 1919 included: (a) 34,330,920 pounds of refined lead produced at Tadanac, B.C., and pig-lead produced at Galetta, Ont.; (b) 9,448,113 pounds, the estimated recoveries from lead ores exported; and (c) 48,666 pounds, the estimated recoveries from the gold and silver ores of Ontario, also exported.

The total shipments of lead ores and concentrates, as reported by the operators, were in 1920, 64,493 tons, valued at \$2,985,848, and containing 36,325,507 pounds of lead, as against 54,508 tons, valued at \$3,044,839, and containing 32,147,989 pounds of lead, in 1919.

The production of refined lead at Trail in 1920 was 13,237 tons, as against 16,446 tons in 1919.

The production of lead bullion and pig-lead amounted in 1920 to 15,138 tons, as against 17,795 tons in 1919.

The imports of lead, including the lead in pigments, salts, etc., in 1920, were 15,720 tons, valued at \$2,743,451, with also manufactures of lead valued at \$265,507. The imports in 1919 were 7,876 tons of lead, valued at \$883,536, besides manufactures of lead valued at \$138,729.

The exports of lead in 1920 amounted to 3,784.1 tons, valued at \$387,685, and included: lead in ores, etc., 3,774.7 tons, valued at \$385,839, and pig-lead, 9.9 tons, valued at \$1,846. The exports in 1919 amounted to 12,234.8 tons, valued at \$1,389,012, and included: lead in ores, etc., 6,571.5 tons, valued at \$616,278; and pig-lead, 5,663.4 tons, valued at \$772,734.

The average price of lead in Montreal, the main Canadian market in 1920, was 8.940 cents per pound, as against 6.966 cents in 1919.

Summary of Lead Statistics

	1917	1918	1919	1920
Ores and concentrates shipped (a)..... Tons.	46,799	75,256	54,508	69,493
“ “ (a)..... Value.	\$3,866,862	\$4,705,573	\$3,044,839	\$2,985,848
Lead production..... Tons.	16,288	25,699	21,914	17,977
“ “..... Value.	\$3,628,070	\$4,754,315	\$3,053,037	\$3,212,262
Imports of lead..... Tons.	8,490	7,853	7,876	15,720
“ (b)..... Value.	\$1,732,428	\$1,350,689	\$1,022,265	\$3,008,958
Exports of lead, in ores, and as pig..... Tons.	7,208	15,073	12,235	3,784
“ “..... Value.	\$987,509	\$1,990,697	\$1,389,012	\$387,685
Number of men employed.....	1,914	1,691	1,615	1,443
Wages paid.....	\$2,295,090	\$1,980,351	\$1,884,338	\$1,751,428

(a) Does not include zinc ore shipments—See “Zinc.”

(b) Includes manufactures of lead for which no quantities are given; in 1917, \$165,764; in 1918, \$110,442; in 1919, \$138,729, and in 1920, \$265,507.

MERCURY

There has been no production of mercury recorded since 1897, although the Kerr Lake Mines, Limited, of Cobalt, Ont., in their report to shareholders mention a small recovery for 1918 and 1919.

The imports of mercury in 1920 were 209,030 pounds, valued at \$272,152, as against 26,465 pounds, valued at \$31,573, in 1919.

The average price of mercury in New York in 1920 was \$81.12 per flask of 75 pounds, as against \$92.15 in 1919.

MOLYBDENUM

There was no production of molybdenite in 1920, whereas in 1919 the production amounted to 83,002 pounds, valued at \$69,203, and in 1918 to 378,029 pounds, valued at \$434,733.

The production of molybdenum ores was stimulated during the war period by the demand for molybdenum for munition purposes, and although its use in the peaceful trades has been greatly extended, such relatively small quantities are required that the surplus stocks left over at the end of hostilities have been very slowly liquidated.

The exports of molybdenite in 1920 were 100 pounds, valued at \$75, as against 113,500 pounds, valued at \$84,226, in 1919, and 351,600 pounds, valued at \$402,435, in 1918.

Summary of Molybdenum Statistics

		1916	1917	1918	1919
Ore mined.....	Tons.	13,522	26,871	34,030	7,280
Ore treated.....	"	9,106	22,605	33,935	6,783
Ore or concentrates shipped.....	"	610	1,554	461	46
	Value.	\$188,316	\$320,006	\$428,807	\$69,203
MoS ₂ contents of shipments paid for.....	Pounds.	156,461	288,705	378,029	83,002
"	Value.	\$156,461	\$288,705	\$434,733	\$69,203
Exports of molybdenite.....	Pounds.	(a)	(b) 64,700	351,600	113,500
"	Value.	(a)	(b) \$ 81,173	\$402,435	\$84,226
Men employed.....	No.	262	501	119	105
Wages paid.....	\$	\$122,072	\$260,692	\$274,945	\$35,536

(a) No figures available for 1916.

(b) Cover 9 months only.

NICKEL

The production of nickel in 1920 amounted to 61,335,706 pounds (30,667.9 tons), valued at \$24,534,282 (40 cents per pound), as against 44,544,883 pounds (22,272.4 tons), valued at \$17,817,953 (40 cents per pound), in 1919, showing an increase of 37.7 per cent.

This production included: (a) the nickel in the matte produced from the treatment of the Ontario nickel-copper ores partly refined in Canada at Port Colborne, Ont., and at Deschenes, Que., and partly exported for refining; and (b) the refined nickel and the estimated contents of the nickel oxides and nickel salts produced in the southeastern Ontario smelters from the treatment of the silver-cobalt-nickel-arsenic ores of the Cobalt area.

The refined nickel produced in 1920 amounted to 5,481.4 tons, as against 5,064 tons in 1919.

There were mined in 1920, 1,135,792 tons of nickel-copper ores, and smelted 1,086,159 tons, from which were produced 57,938 tons of Bessemer matte carrying approximately 30,557 tons of nickel and 16,000 tons of copper. In 1919 there were mined 572,400 tons of ore and smelted 754,567 tons, from which were produced 42,736 tons of Bessemer matte carrying approximately 22,035 tons of nickel and 12,099 tons of copper.

The imports of nickel in 1920 were valued at \$827,543, and included: (a) nickel, nickel silver, German silver, in ingots, blocks, bars, sheets, etc., 735,663 pounds, valued at \$256,559; and (b) manufactures of nickel valued at \$570,984. The imports of nickel in 1919 were valued at \$585,405 and included: (a) nickel, nickel silver, German silver, in ingots, bars, sheets, etc., 726,408 pounds, valued at \$242,342; and (b) manufactures of nickel valued at \$343,063.

The exports of nickel in 1920 amounted to 60,199,300 pounds, valued at \$11,988,857 and included: (a) nickel in ore and matte 51,701,000 pounds, valued at \$9,006,140; and (b) nickel fine 8,498,300 pounds valued at \$2,982,717. The exports in 1919 were 41,016,400 pounds, valued at \$8,077,593 and included: (a) nickel in ore, etc., 30,395,400 pounds valued at \$4,785,173; and (b) nickel fine, 10,621,000 pounds, valued at \$3,292,420.

The price of electrolytic nickel in New York was quoted at 45 cents per pound throughout 1919 and 1920.

(a) Includes manufactures of nickel for which no quantities are given: in 1917, \$149,718; in 1918, \$204,208; in 1919, \$343,063; and in 1920, \$570,984.

The most important sources of the metals of the platinum group in Canada are those of the nickel-copper ores, but no attempt to recover them in Canada had been made previous to 1919, these metals have been recovered for several years past in the refineries in the United States and England. No data is available as to the recoveries in England, but those reported in the United States are believed to be derived mostly if not all from the treatment of the Canadian nickel-copper matte. These metals of the platinum group are now being recovered in an impure state at the refinery of the International Nickel Company of Canada, Limited, at Port Colborne, Ont., and will soon be recovered also at the plant of the British America Nickel Corporation, Limited, at Deschenes, Que.

The Royal Mint at Ottawa has also recovered a few ounces of platinum during the last few years from the treatment of the residues obtained in its refinery.

The Port Colborne refinery of the International Nickel Company of Canada reported in 1920 a recovery, in an impure state, of 89 ounces of platinum, 174 ounces of palladium, and 20 ounces of rhodium, osmium, etc., with also a certain quantity of gold and silver. The recovery in 1919 was 25 ounces of platinum and 62 ounces of palladium with also a small quantity of gold and silver.

The recoveries at the New Jersey refinery were in 1920, 488.9 ounces of platinum, 739.2 ounces of palladium, 390.3 ounces of rhodium, and 102.4 ounces of osmium, iridium and ruthenium. The recoveries in 1919 were: 616.7 ounces of platinum, 762.2 ounces of palladium, 227.3 ounces of rhodium, and 76.6 ounces of osmium, iridium, and ruthenium.

The Mond Nickel Company has not furnished figures as to the precious metal contents of its matte, nor of the recoveries from the residues.

The British America Nickel Corporation has not yet started treating the residues produced from the operations at Deschenes, Que.

The recovery at the Royal Mint, Ottawa, in 1920 was: 14.6 ounces of platinum valued at \$775.07, as against 23.3 ounces of platinum valued at \$1,990, and 0.7 ounces of palladium valued at \$87 in 1919. There was also in 1919 a small recovery of iridium produced from the treatment of the South African gold bullion.

The production from the alluvial sands in 1920 was 17 crude ounces, valued at \$719, as against 25 crude ounces, valued at \$2,150, in 1919.

The imports of platinum in 1920 were valued at \$125,977 and included: (a) platinum crucibles, valued at \$13,772; (b) platinum wire, bars, strips, etc., valued at \$105,718; and (c) platinum retorts, etc., valued at \$6,487. The imports in 1919 were valued at \$160,885 and included: (a) crucibles, valued at \$15,642; (b) wire, bars, strips, etc., valued at \$144,989; and (c) retorts, etc., valued at \$254.

The exports of platinum in 1920 amounted to 790 ounces, valued at \$85,740, and included: (a) platinum in ore, etc., 473 ounces, valued at \$53,956; and (b) platinum "old and scrap," 317 ounces, valued at \$31,784. The exports of platinum in 1919 were 671 ounces, valued at \$62,629, and included: (a) platinum in ore, etc., 325 ounces, valued at \$28,815; and (b) platinum "old and scrap," 346 ounces, valued at \$33,814.

Summary of Platinum Statistics

	1917	1918	1919	1920
Platinum production from alluvial sands.....	Ozs. 57 Value \$3,823	Ozs. 39 Value \$2,560	Ozs. 25 Value \$2,150	Ozs. 17 Value \$719
Platinum recovered at the Ottawa Royal Mint	Ozs. 18 Value \$1,663	Ozs. 16 Value \$1,456	Ozs. 23 Value \$1,990	Ozs. 15 Value \$775
Platinum metals recovered in Canada from the treatment of Sudbury mattes:				
Platinum.....	Ozs. Value		Ozs. 25 Value \$1,447	Ozs. 89 Value \$5,665
Palladium.....	Ozs. Value		Ozs. 62 Value \$3,534	Ozs. 174 Value \$11,096
Rhodium, etc.....	Ozs. Value			Ozs. 20 Value \$1,249
Platinum metals recovered in United States from treatment of Sudbury mattes:*				
Platinum.....	Fine Ozs. 971	650	617	489
Palladium.....	" " 1,354	787	762	739
Rhodium.....	" " 325	473	227	390
Osmium, iridium and ruthenium.....	" "		77	102
Imports of platinum as crucibles, wire, bars, etc.....	Value \$114,279	\$31,140	\$160,885	\$125,977
Exports of platinum in conc'tes and "old scrap"	Ozs. 331 Value \$29,599	Ozs. 197 Value \$20,892	Ozs. 671 Value \$62,629	Ozs. 790 Value \$85,740

*Other residues have occasionally been treated along with those derived from the Sudbury mattes but it is believed that the greater part of these recoveries may be credited to the Canadian source.

SILVER

The production of silver in 1920 amounted to 13,330,357 fine ounces, valued at \$13,450,330 (100.9 cents per ounce), as against 16,020,657 fine ounces, valued at \$17,802,474 (111.122 cents per ounce), in 1919, being a decrease of 16.8 per cent in quantity and 24.5 per cent in value.

The production in 1920 included: (a) refined silver and silver in gold and silver bullion, 9,201,094 ounces; (b) silver contained in blister copper and lead bullion, 2,373,650 ounces; and (c) silver estimated as recoverable from ores, etc., 1,755,613 ounces.

The production in 1919 included: (a) refined silver and silver in bullion, 11,717,599 ounces; (b) silver contained in blister copper, 927,308 ounces; and (c) silver estimated as recoverable from ores exported, 3,375,750 ounces.

In 1920 Ontario produced 74.3 per cent of the total, as against 75.5 per cent in 1919; British Columbia produced 25.0 per cent, as against 23.1 per cent in 1919. The balance was derived from Quebec, Manitoba, and the Yukon Territory.

The imports of silver in 1920 were: (a) silver bullion, valued at \$2,453,450; (b) sterling silver, valued at \$314,869; (c) silver coins, valued at \$100; and (d) silver medals, valued at \$14,043. The imports in 1919 were: (a) silver bullion, valued at \$3,458,097; and (b) sterling silver, valued at \$131,766.

The exports of silver in 1920 were: 11,834,504 fine ounces, valued at \$12,238,209, and included: (a) silver in ores, etc., 1,903,130 ounces, valued at \$2,007,550; and (b) silver in bullion, 9,931,374 ounces, valued at \$10,230,659. The exports in 1919 were: 15,405,161 ounces, valued at \$16,410,797, and included: (a) silver in ore, etc., 2,854,928 ounces, valued at \$2,850,592; and (b) silver in bullion, 12,550,223 ounces, valued at \$13,560,205.

The price of silver, which was around \$1.35 per ounce in January, 1920, gradually declined throughout the year, being quoted at about \$1 in the middle of May and at a minimum of 63 cents in December. The average for the year was 100.9 cents per ounce.

Summary of Silver Statistics

	1917	1918	1919	1920
Shipments from the mines of Cobalt and adjacent districts:—				
Ores and concentrates (a).....	{ Tons. 72,719	73,646	62,045	52,328
	{ Value. \$10,123,838	\$9,763,737	\$7,096,775	\$4,703,215
Silver bullion.....	{ Tons. 318	228	179	176
	{ Value. \$7,628,740	\$6,821,528	\$4,868,543	\$5,247,809
Total silver production of Canada (b).....	{ Fine oz. 22,221,274	21,383,979	16,020,657	13,330,357
	{ Value. \$18,091,895	\$20,693,704	\$17,802,474	\$13,450,330
Production by Provinces:—				
Quebec.....	Ozs. 136,194	178,675	140,926	61,003
Ontario.....	19,301,835	17,198,737	12,117,878	9,907,626
Manitoba.....	" 7,201	13,316	20,760	15,510
British Columbia.....	" 2,655,994	3,921,336	3,713,537	3,327,028
Yukon.....	" 119,605	71,915	27,556	19,190
Alberta and New Brunswick.....	" 445			
Imports of silver, as bullion, sterling and coins Value.	\$1,063,418	\$437,270	\$3,589,863	\$2,453,450
Exports of silver, as bullion and in ores, etc. { Ozs. 21,718,784	19,357,076	15,405,161	11,834,504	
	{ Value. \$17,621,398	\$18,382,902	\$16,410,797	\$12,238,209
Number of men employed in Cobalt district.....	2,448	2,187	2,017	1,790
Wages paid.....	\$2,667,607	\$2,918,474	\$2,556,767	\$2,844,666

(a) Does not include the ore treated in the reduction plants, at the mines.

(b) Includes silver from silver ores of Cobalt district, with also that derived from the treatment of the lead, zinc, gold, and copper ores.

TIN

Tin ores have not yet been found in sufficient quantities in Canada to be of economic importance.

The imports of tin in 1920 were valued at \$4,505,393, as against \$3,367,900 in 1919, and included tin in blocks, pigs, etc., tin foil, bichloride of tin, tin ware and tin crystals.

There are also large imports of tin-plates, sheets, wire products tin-plated, the quantity in 1920 being 68,183 tons, valued at \$10,130,224, as against 43,407 tons, valued at \$6,436,047, in 1919.

TUNGSTEN

There has been no production of tungsten ore reported since 1918. The production has been intermittent and in very small quantities, and has been derived mostly from the mines at Burnt Hill, New Brunswick, and at Moose River, Nova Scotia.

ZINC

The production of zinc in 1920 amounted to 39,863,912 pounds, valued at \$3,057,961 (7.671 cents per pound), as against 32,194,707 pounds, valued at \$2,362,448 7.338 cents per pound), in 1919.

The production in 1920 included: (a) 37,034,000 pounds of refined zinc produced at Tadanac, B.C.; and (b) 2,829,912 pounds, being the estimated recoveries from ores and concentrates exported to the United States. The production in 1919 included: (a) 24,652,000 pounds of refined zinc; and (b) 7,542,707 pounds, the estimated recoveries from ores and concentrates exported.

The total shipments of zinc ores and concentrates from the mines were, in 1920, 249,136 tons, valued by the operators at \$1,157,844, and containing 91,033,202 pounds of zinc, as against 135,535 tons, valued at \$1,049,493, and containing 59,959,709 pounds of zinc.

The imports of zinc in pigs, sheets, etc., and manufactures in 1920, were 27,272,102 pounds, valued at \$2,458,205, besides other manufactures of zinc valued at \$96,961, as against 26,445,461 pounds, valued at \$2,088,021, and other manufactures of zinc valued at \$43,155.

The imports of brass, which alloy contains about 30 per cent zinc, were valued in 1920 at \$1,097,121, with also manufactures of brass, valued at \$5,240,654, as against imports of brass valued at \$697,996, and manufactures of brass valued at \$3,559,742, in 1919.

The exports of zinc in 1920 were: zinc ore, 3,126 tons, valued at \$122,387, and metallic zinc, 3,490 tons, valued at \$512,279, as against 6,630 tons of zinc ore valued at \$296,212, and 3,847 tons of metallic zinc valued at \$70,249 in 1919.

The exports of brass in 1920 were valued at \$851,511 and included: (a) brass "old and scrap," 3,439,800 pounds, valued at \$475,809; (b) brass rods, sheets, etc., 244,000 pounds, valued at \$49,728; and (c) brass valves, valued at \$325,974. The exports in 1920 were valued at \$1,685,941 and included: (a) "old and scrap," 9,656,900 pounds, valued at \$1,275,448; (b) rods, sheets, etc., 535,500 pounds, valued at \$173,654; and (c) valves, valued at \$236,839.

The price of zinc in Montreal in 1920 averaged 9.558 cents per pound, as against 9.284 cents in 1919.

There was no quotation for zinc in New York during the last quarter of the year, so that no average can be given.

The price in St. Louis averaged 7.671 cents per pound. This price is slightly below the New York price.

Summary of Zinc Statistics

		1917	1918	1919	1920
Ores and concentrates shipped.....	{ Tons.	116,489	121,200	135,535	249,136
	{ Value.	\$1,323,985	\$1,228,195	\$1,049,493	\$1,157,844
Zinc production.....	{ Tons.	14,834	17,542	16,097	19,932
	{ Value.	\$2,640,817	\$2,862,436	\$2,362,448	\$3,057,961
Refined zinc product.....	{ Tons.	9,985	12,574	12,326	18,517
	{ Tons.	18,566	15,655	13,223	13,636
Imports of zinc.....(a)	{ Value.	\$3,641,272	\$2,804,027	\$2,131,176	\$2,458,205
Imports of brass and man'rs of brass.....	{ Value.	\$4,051,410	\$4,670,140	\$4,257,738	\$6,337,775
Exports.....				\$1,685,941	\$851,511
Exports of zinc ore.....	{ Tons.	(c) 5,972	10,545	6,630	3,126
	{ Value.	\$320,296	\$476,791	\$296,212	\$122,387
Exports of metallic zinc.....	{ Tons.	(d)	(d)	3,847	3,490
	{ Value.	(d)	(d)	\$701,249	\$512,279

(a) Includes manufactures of zinc valued at \$21,711 in 1915; at \$48,101 in 1916; at \$79,044 in 1917; at \$85,177 in 1918, at \$43,155 in 1919, and at \$96,961 in 1920.

(b) Not separately classified previous to April, 1918.

(c) For nine months only.

(d) Previous to 1919 not separately classified.

NON-METALLIC PRODUCTS

ABRASIVE MATERIALS

Corundum.—Sales of grain corundum in 1920 were reported as 197 tons, valued at \$24,547. There were no sales in 1919.

Three hundred and twenty-two tons of grain corundum were recovered in 1920 from 13,025 tons of old mill tailings treated, as against twenty-six tons recovered in 1919 from 1,300 tons. In the earlier days of the industry from 6 to 10 per cent of the rock milled was recovered in the form of grain corundum. During recent years a much lower grade has been milled.

Corundum is found in an area embracing several townships in Renfrew and Hastings counties, in the province of Ontario. The industry made its appearance there in 1900, the production reaching a maximum in 1906. From 1907 to 1913 the yearly production was smaller, but fairly uniform. Operations were indefinitely suspended during August, 1918, but were renewed again in 1919, since which time old tailings have been treated for the recovery of grain corundum.

Exports for the calendar year 1920 are given by the "Trade" reports as 954 tons, valued at \$115,031.

Grindstones, Pulpstones, etc.—The total production of grindstones, pulpstones, and scythestones in 1920 was 2,444 tons, valued at \$88,136, as against a production in 1919 of 2,020 tons, valued at \$60,516.

The production of abrasives has been a long-established industry in Nova Scotia and New Brunswick, and in so far as output is concerned has remained practically stationary for many years.

Production

(In Short Tons)

Calendar Year	Corundum-bearing rock treated	Grain corundum graded	% Recovery	Grain Corundum				Average price, cents per pound
				Sold in Canada	Exported	Total	Total value	
							\$	
1915.....	1,724	116	6.7	21	240	262	33,138	6.33
1916.....	1,864	67	3.6	8	59	67	10,307	7.65
1917.....	4,659	188	4.0	16	172	188	32,153	8.55
1918.....	3,184	137	4.3	0	137	137	26,112	9.9
1919.....	1,300	26	2.0	0	0	0	0	0.
1920.....	(a) 13,025	322	2.5	20	176	196	24,547	6.25

(a) Tailings only.

	1917		1918		1919		1920	
	Quan- tity	Value	Quan- tity	Value	Quan- tity	Value	Quan- tity	Value
		\$		\$		\$		\$
Production—								
Nova Scotia Tons.	375	9,875	256	8,000	283	9,000	211	8,440
New Brunswick... "	2,148	35,879	2,816	75,005	1,737	51,516	2,233	79,696
	2,523	45,754	3,072	83,005	2,020	60,516	2,444	88,136
Exports of grindstones(a)		31,304		47,148		38,682		41,705
Exports—Abrasives.								
(m) Artificial.....						(m) 465,228		
(o) Artificial, crude....Cwt.				2,028,839		(n) 1,040,132	598,664	1,579,508
Artificial, for wheels,etc						(n) 14,858		41,138
(g) Natural, n.o.p.....Cwt.					8,529	10,743	81,330	236,569
Imports—Abrasives								
Grindstones.....		185,607		297,287		281,066		312,672
(b) Burrstones..... No.	519	910	733	1,571	1,106	3,421	343	1,655
(c) Emery.....		79,176		89,020		38,106		69,462
(d) Mfgs. emery.....		553,660		570,892		316,322		471,853
(e) Pumice stone.....		34,162		36,938		29,910		57,068
(f) Iron sand.....		36,737		67,528		10,247		17,000
(g) Sand paper.....		331,776		317,048		362,069		560,180
Artificial abrasives..		112,614		134,328		82,866		251,260
		1,334,642		1,514,612		1,124,007		1,741,150

(a) Including stone for the manufacture of grindstones. (b) Burrstones in blocks, rough or unmanufactured, not bound up or prepared for binding into millstones. (c) Emery in bulk, crushed or ground, duty free. (d) Emery and carborundum wheels and manufactures of emery or carborundum. (e) Pumice and pumice stone, ground or unground. Duty free. (f) Iron sand or globules for polishing glass or granite, or for sawing stone. Duty free. (g) Sandpaper, glass, flint, and emery paper or emery cloth. (m) No entries under this class since April, 1919. (n) Last nine months. (o) Including carborundum; (q) In ore or bulk, crushed or ground; infusorial earth, rotten stone, tripoli, etc.

The grindstones are shipped chiefly in a finished condition and are marketed in Canada, Newfoundland, and the United States, the prices ranging in 1920 from \$30 to \$62 per ton, as against \$30 to \$50 per ton in 1919.

A number of pulpstones are usually made each year. Scythstones, both finished and in the rough, are also shipped, as well as occasionally small quantities of grit for marble polishing.

The greater portion of the Canadian production of grindstones is exported. The value of the finished grindstones so exported during 1920 was \$41,705, as compared with \$38,682, in 1919.

To meet Canadian requirements, in Ontario and Quebec chiefly, there were imported during 1920 grindstones to the value of \$312,672; burrstones, 343, valued at \$1,655; emery, \$69,462; manufactures of emery, \$471,853; pumice stone, \$57,068; sandpaper, \$560,180; iron sand for glass, or polishing, or for sawing stone, \$17,000; artificial abrasives, valued at \$251,260, or a total value of \$1,741,150.

Tripolite (diatomaceous or infusorial earth).—The shipments of tripolite in 1920 were reported as 260 tons, valued at \$8,600, as compared with shipments in 1919 of 565 tons, valued at \$11,300.

The shipments from year to year have varied considerably, and in some seasons the producing companies shipped from stock only, as was the case in 1919.

Since 1902, Nova Scotia has been the only province from which shipments of tripolite have been made. At the present time the principal operator is the Oxford Tripoli Company, operating in Colchester county. The crude product is dried and treated in a small mill.

A brief review of the uses of tripolite, together with a list of the principal known Canadian occurrences, was published in the Annual Report on Mineral Production for 1914.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Production.....	600	\$ 18,000	500	\$ 12,500	565	\$ 11,300	260	\$ 8,600

ACTINOLITE

Mining operations were carried on for a short time only during 1920; shipments were reported as 100 tons, valued at \$1,160—the value of the material after having been milled and prepared for market.

Production of actinolite in Canada has been confined to Elzevir and Kaladar townships, in Hastings and Addington counties, province of Ontario, the centre of the industry being Actinolite. The earliest operations date back to about 1883. For a time deposits were worked only at intervals long apart, when sufficient rock was broken to meet the demand for several subsequent years.

Actinolite is used as an ingredient for a coal-tar roofing compound, the grinding of the crude material being done in such a way so as not to destroy the fibre.

The only shipper in recent years is the Actinolite Mining Company, of Bloomfield, New Jersey, U.S.A., which owns the deposit noted, and also a grinding mill at Actinolite.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Production.....	120	\$ 1,320	228	\$ 2,508	80	\$ 880	100	\$ 1,160

ARSENIC

The demand for arsenic has been particularly strong. The Canadian production includes arsenious oxide, refined and crude, produced in the smelting of the arsenical silver-cobalt-nickel ores of the Cobalt district; in addition to which arsenic has been recovered at Tacoma, Wash., from the arsenical gold concentrates shipped from the Hedley gold mine at Hedley, B.C.

The total production in 1920 was 1831 tons of arsenious oxide and approximately 628 tons of arsenic in concentrates, having a total valuation of \$447,848. The production in 1919 was 2,859 tons of arsenious oxide and approximately 530 tons of arsenic in concentrates, having a total valuation of \$509,924.

The exports of white arsenic in 1920 were 1,655 tons, valued at \$313,311. The imports of white arsenic were 962 pounds, valued at \$201; imports of sulphide of arsenic, 337,153 pounds, valued at \$43,445; and imports of arseniate, bi-arseniate, and stannate of soda, 48,863 pounds, valued at \$10,568.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Production:—		\$		\$		\$		\$
From arsenical concentrates.....	280	11,200	1,078	43,114	530	21,213	628	22,231
White arsenic.....	2,656	658,231	2,482	520,525	2,859	488,706	1,831	425,617
	2,936	669,431	3,560	563,639	3,389	509,924	2,459	447,848
Exports: arsenic.....	4,286	507,898	2,672	393,883	2,506	355,654	1,655	313,311
Imports:—	Pounds.		Pounds.		Pounds.		Pounds.	
White arsenic.....	247,610	32,083	995	222	4,706	1,325	962	201
Sulphide of arsenic.....	252,848	22,053	301,985	33,351	304,694	26,613	337,153	43,445
Arsenate of soda.....	4,469	588	121	34	5,566	1,661	48,863	10,568

ASBESTOS

As usual the production has all been derived from Black Lake, Thetford, Robertsonville, Coleraine, East Broughton and Danville, in the Eastern Townships, province of Quebec.

There was a slight increase in the output of both crude and milled asbestos in 1920 as compared with the previous year. The shipments however showed an increase of over 30 per cent in quantity, and 35 per cent in value.

The total value of the shipments of asbestos and asbestic in 1920 was \$14,792,201, as against \$10,975,369 in 1919.

The average number of men employed in mining was 2,150 and in milling 1,422, or a total of 3,572, and the total wages paid were \$4,765,305. The tonnage of rock mined and quarried was 3,142,827 and the tonnage milled 2,668,946.

Exports of asbestos during 1920 were 152,740 tons, valued at \$11,521,536, or an average of \$75.43 per ton, and of asbestic sand and waste, 36,303 tons, valued at \$365,920, or an average of \$10.08 per ton. There was also an export of manufactures of asbestos valued at \$196,067. In 1920 there were 11,881 tons, valued at \$1,270,172, exported to Great Britain; 115,283 tons, valued at \$7,955,772, to United States; 2,011 tons, valued at \$216,867, to France; 2,390 tons, valued at \$290,609, to Italy; 4,863 tons, valued at \$293,344, to Japan; 8,251 tons valued at \$698,615, to Belgium; 3,265 tons, valued at \$396,933, to Germany; and 4,796 tons, valued at \$399,224, to other countries.

The imports of asbestos and manufactures of asbestos in 1920 were valued at \$1,047,031.

Output, Sales, and Stocks of Asbestos

	Output		Sales			Stocks on hand December 31		
	Tons		Tons	Value	Per ton	Tons	Value	Per ton
1919				\$	\$		\$	\$
Crude.....	4,065		3,928	3,214,022	818.23	1,338	974,260	728.14
Mill stock.....	153,507		132,837	7,695,430	57.93	31,110	1,952,629	62.76
Asbestic.....	157,572		136,765	10,909,452	79.77	32,448	2,926,889	90.20
			22,471	65,917	2.93			
1920								
Crude.....	4,098		3,894	3,811,762	978.88	1,295	1,443,583	1,124.73
Mill stock.....	165,348		174,723	10,922,837	62.52	22,114	1,650,981	74.66
Asbestic.....	169,446		178,617	14,734,599	82.49	23,409	3,094,564	132.19
			20,956	57,602	2.75			

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Rock mined.....	2,635,010	\$	2,462,381	\$	3,082,384	\$	3,142,827	\$
Rock milled.....	2,260,191		2,185,572		2,636,783		2,668,946	
Output—								
Milled.....	135,475		139,143		153,507		165,348	
Crude.....	6,268		4,313		4,065		4,098	
	141,743		143,456		157,572		169,446	
Mill recovery %...	6.0		6.4		5.8		6.2	
Sales—								
Asbestos.....	135,502	7,183,099	141,462	8,936,804	136,765	10,909,452	178,617	14,734,599
Asbestic.....	18,279	47,284	16,797	33,993	22,471	65,917	20,956	57,602
	153,781	7,230,383	158,259	8,970,797	159,236	10,975,369	199,573	14,792,201
Exports—								
Asbestos.....	93,932	4,903,326	119,454	7,786,710	119,122	9,625,695	152,740	11,521,536
Sand and waste.	52,088	430,956	22,144	228,059	25,306	260,775	36,303	365,920
Manufactures...		55,666		40,763		232,501		196,067
		5,389,948		8,055,532		10,118,971		12,083,523
Imports—		537,431		604,703		656,037		1,047,031

BARYTES

Shipments of ground barytes in 1920 were 751 tons, valued at \$22,983, as compared with 468 tons, valued at \$8,154, in 1919.

During recent years the only barytes deposit worked in Canada has been that at Lake Ainslie, Inverness county, N.S. In the province of Ontario, however, a deposit located in Langmuir township, south of Porcupine, has been under development during the past few years by the Premier Langmuir Mines, Limited.

The imports of barytes were 2,998 tons, valued at \$74,314. The imports of barium peroxide for the manufacture of hydrogen peroxide amounted to 83 tons, valued at \$40,986, in 1920, as compared with 52 tons, valued at \$23,788, in 1919. There is also a small import of artificial sulphate of barium known as blanc fixé, the imports being included with satin white. These imports in 1920 were 2,429 tons, valued at \$102,198.

Blanc fixé (barium sulphate) is artificially prepared by treating a solution of barium salt, generally the chloride with sulphuric acid, or aluminium sulphate. It is used for coating papers.

Satin white is an artificially prepared mineral for coating paper, consisting of precipitated calcium sulphate and alumina, prepared by grinding together the necessary proportions of alum and slaked lime with sufficient water.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production—								
Nova Scotia.....	3,490	54,027	580	9,145	468	8,154	751	22,983
Ontario.....			60	1,020				
Imports—								
Barium peroxide.....	73	17,893	53	27,893	52	23,788	83	40,986
Blanc fixé and satin white.....	3,600	90,482	3,528	92,241	3,718	114,732	2,429	102,198
Barytes.....					(a) 1,585	34,441	2,998	74,314

(a) Not separately classified previous to April, 1919.

CHROMITE

The total shipments in 1920 of ores and concentrates, all from the Eastern Townships, Quebec, were 11,016 short tons, valued at \$251,379, or an average of \$22.82 per ton, the total content of Cr_2O_3 being 5,105 tons.

The 1920 shipments included: crude ore, 3,095 short tons, valued at \$78,495, or an average of \$25.36 per ton, and with an average of Cr_2O_3 content of 38.0 per cent; concentrates, 7,921 short tons, valued at \$172,884, or an average of \$21.83 per ton, and with an average Cr_2O_3 content of 49.6 per cent. The crude ore shipped included 1,482 tons sold for consumption in Canada and 1,613 tons sold for export. The concentrates with the exception of about 339 tons were sold for export.

The exports of chromite in 1920 as per "Trade" reports were 8,431 tons, valued at \$151,456, or an average of \$17.96 per ton, as compared with exports in 1919 of 9,078 tons, valued at \$198,733, or an average of \$21.89 per ton.

Ferro-chrome has been imported into Canada, but there is no separate record of the quantities thereof. The imports of bichromate of soda in 1920 were 1,358,080 pounds, valued at \$267,235; and imports of bichromate of potash, 37,825 pounds, valued at \$14,256.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production (shipments)—								
Crude ore.....	20,153	441,540	15,605	456,408	3,376	69,894	3,095	78,495
Concentrates.....	3,558	140,256	6,389	410,714	5,165	159,004	7,921	172,884
	a 23,711	581,796	21,994	867,122	8,541	228,898	11,016	251,379
Shipments by Provinces—								
Quebec.....	36,725	499,682	21,324	835,727	8,541	228,898	11,016	251,379
Br. Columbia.....			670	31,395				
Exports.....	19,229	342,528	15,831	353,616	9,078	198,733	8,431	151,456
Imports—								
Bichromate of soda.....	667	248,621	523	208,669	502	113,478	679	267,235
Bichromate of potash....	10.1	6,697	10.4	10,686	29	19,525	8	5,650

(a) Shipments as reported directly by operators in 1917, were 36,725 tons valued at \$499,682.

COAL AND COKE

Coal.—The total production of marketable coal during 1920 (comprising sales, colliery consumption, and coal used in making coke, or used otherwise by colliery operators) was 16,631,954 short tons, valued at \$80,693,723, or an average of \$4.85 per ton.

The production in 1919 was 13,681,218 short tons, valued at \$54,413,349, compared with which the 1920 production shows an increase of 2,950,736 tons, or 21.57 per cent in quantity, and \$26,280,374, or 48.30 per cent, in total value.

The total output of coal, including waste and unmarketable slack, in 1920, was 17,023,391 tons, as against 14,080,655 tons in 1919.

The 1920 production included 155,679 tons of anthracite, all from one mine in Alberta; 12,865,851 tons of bituminous coal and 3,610,424 tons of lignite.

The Nova Scotia production increased by 708,918 tons, as compared with 1919; New Brunswick fell off by 13,060 tons; Saskatchewan decreased by 36,694 tons; Alberta increased by 1,868,965 tons; British Columbia increased by 422,944 tons; and Yukon decreased by 337 tons.

Output¹ and Production² of Coal by Provinces, 1920

Province	No. of active operators	Average No. of men employed	Wages paid	Production of Coal				Output Short tons
				Short tons	Per cent of total	Value	Average per ton	
			\$		%	\$	\$	
Nova Scotia.....	28	12,241	17,282,725	6,429,291	38.66	32,238,129	5.02	6,495,237
New Brunswick.....	14	476	584,344	166,048	1.00	1,055,286	6.36	165,811
Saskatchewan.....	63	453	582,964	343,475	2.06	819,320	2.38	346,328
Alberta.....	250	10,054	19,667,521	6,833,500	41.09	29,849,608	4.37	6,904,935
British Columbia.....	13	6,156	11,049,071	2,858,877	17.17	16,726,950	5.85	3,110,217
Yukon Territory.....	1	7	4,613	763	.....	4,430	6.00	863
Total.....	369	29,387	49,171,238	16,631,954	100.00	80,693,723	4.85	17,023,391

¹ Output includes waste and unmarketable slack. ² Production includes sales, colliery consumption and coal used by operators in making coke, or for other uses.

Coal: Production by Provinces, by Kinds, Imports and Exports

	1917		1918		1919		1920	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
		\$		\$		\$		\$
Output.....	14,435,361	.....	15,460,385	.....	14,080,655	.....	17,023,391	.....
Production: by provinces—								
Nova Scotia.....	6,327,091	19,410,737	5,818,562	21,095,470	5,720,373	22,078,726	6,429,291	32,238,129
N. Brunswick.....	189,095	708,010	268,212	1,331,710	179,108	794,761	166,048	1,055,286
Saskatchewan.....	355,445	662,451	346,847	722,148	380,169	820,522	343,475	819,320
Alberta.....	4,736,368	14,153,685	5,972,816	20,537,287	4,964,535	18,294,495	6,833,500	29,849,608
B. Columbia.....	2,433,888	8,235,716	2,568,589	11,494,681	2,435,933	12,420,445	2,858,877	16,726,950
Yukon.....	4,872	29,232	2,900	11,600	1,100	4,400	763	4,430
	14,046,759	43,199,831	14,977,926	55,192,896	13,681,218	54,413,349	16,631,954	80,693,723
Production: by kinds—								
Anthracite.....	108,225	35,359,920	115,405	44,967,894	111,324	44,357,443	155,679	65,974,658
Bituminous.....	11,154,251		11,636,190		10,642,902		12,865,851	
Lignite.....	2,784,283	7,839,911	3,226,331	10,225,002	2,926,992	10,055,906	3,610,424	14,719,065
Imports—								
Bituminous ¹	12,407,486	33,712,894	13,656,360	37,291,057	10,127,965	24,750,717	11,548,475	50,808,626
Bituminous ²	3,129,776	8,739,877	3,237,067	8,351,639	2,228,197	4,814,388	2,312,754	10,451,621
Anthracite.....	5,320,198	28,109,586	4,785,160	26,007,888	4,952,675	31,595,694	4,881,313	36,773,351
	20,857,460	70,562,357	21,678,587	71,650,584	17,308,837	61,160,799	18,742,542	98,033,598
Exports—								
The produce of								
Canada.....	1,733,156	7,387,192	1,817,195	9,405,423	2,070,050	12,438,885	2,558,174	18,014,899
All other.....	47,328	173,176	67,486	205,389	56,988	157,202	84,801	501,911
Consumption.....	33,123,735	106,201,820	34,771,832	117,232,668	28,863,017	102,978,061	32,731,521	160,210,511

¹ Round and run-of-mine. ² Slack such as will not pass through $\frac{3}{4}$ screen

Coke.—The accompanying statistics cover only the production of coke in by-product and Beehive oven plants and do not include retort coke recovered by gas companies.

Both domestic and imported coal are used in the manufacture of coke in Canadian coke-oven plants.

The total output during 1920 was 1,306,644 short tons made from 2,046,969 tons of coal, of which 957,945 tons were of domestic origin and 1,089,024 tons imported. The output thus averaged 0.638 tons of coke per ton of coal charged. The total coke used, or sold by producers during the year was 1,327,180 tons, valued at \$14,515,674, or an average of \$10.94 per ton.

By provinces the output was: Nova Scotia, 428,298 tons; Ontario, 726,728 tons; and British Columbia, 151,618 tons.

The ovens operated during the year were those at Sydney and Sydney Mines, N.S., Sault Ste. Marie and Hamilton, Ont., and Fernie and Anyox, B.C.

At the close of the year 660 ovens were in operation.

The exports of coke in 1920 were 39,536 tons, valued at \$390,161, or an average of \$9.87 per ton, as against exports in 1919 of 14,709 tons, valued at \$129,703, or an average of \$8.82 per ton. The imports of coke in 1920 were 586,406 tons, valued at \$6,458,596, or an average of \$11.01 per ton, as against imports in 1919 of 383,374 tons, valued as \$2,405,740, or an average of \$6.27 per ton.

The estimated consumption of oven coke in 1920 was 1,874,050 tons as compared with 1,502,345 tons in 1919.

Of the total output of coke, 1,140,276 tons or 87.3 per cent, were made in by-product recovery ovens and the recovery of by-products included: ammonium sulphate, 19,934 tons, and tar, 14,026,172 gallons, as against 11,765 tons of ammonium sulphate and 12,394,249 gallons of tar in 1919.

Coke and Coke By-products

	1917		1918		1919		1920	
	Quantity	Value \$	Quantity	Value \$	Quantity	Value \$	Quantity	Value \$
Coal charged—								
Domestic.....	1,379,038		1,348,232		854,835		957,945	
Imported.....	549,885		635,010		1,025,706		1,089,024	
Total.....	1,928,923		1,983,242		1,880,541		2,046,969	
Output: coke.....	1,231,865		1,258,284		1,160,470		1,306,644	
Recovery.....	63.9		63.4		61.7		63.8	
Production—								
Nova Scotia.....	643,757	3,218,785	580,433	5,066,609	383,253	3,939,906	429,618	4,349,986
Ontario.....	389,048	2,155,326	425,087	3,300,127	649,506	4,886,662	746,246	8,163,613
Alberta.....	31,649	181,982	32,564	213,884	565	3,602	.....	.....
British Columbia.....	181,408	1,106,488	212,570	1,554,575	100,356	890,217	151,316	2,002,075
Total.....	1,245,862	6,662,581	1,250,744	11,035,195	1,133,680	9,720,387	1,327,180	14,515,674
Exports.....	23,595	137,318	29,612	223,629	14,709	129,703	39,536	390,161
Imports.....	970,106	6,517,260	1,165,590	8,975,445	383,374	2,405,740	586,406	6,458,596
Consumption.....	2,192,373	13,042,523	2,386,722	19,787,011	1,502,345	11,996,424	1,874,050	20,584,109
By-products—								
Ammonium Sulphate—								
Production.....	9,941		10,825		11,765		19,934	
Imports.....	283.5	26,062	4.2	1,273	101.7	12,129	312.3	31,531
Exports.....	(a) 8,047	693,377	8,696	1,027,558	18,488	1,821,880	18,329	1,896,060
Tar—								
Production.....	8,277,078		8,009,327		12,394,249		14,026,172	
Exports.....		43,547		67,646	(b) 836,210	61,654	8,815,172	481,259
Imports: coal tar, crude, and coal pitch.....		146,962	2,579,273	192,569	2,988,286	193,011	3,527,667	256,740
Imports: coal tar, base or salt (paranitraniline)—								
Gas.....	81,978	61,103	96,458	63,803	60,463	43,205	82,466	51,395
Ovens in operation Dec. 31.....	3,963,826		4,699,009		8,538,210		10,675,863	
No.....	1,657		1,640		587		660	

(a) Not separately shown previous to April, 1917.

(b) Quantity for 9 mos.

FELDSPAR

The shipments of feldspar in 1920 were 37,873 tons, valued at \$280,895, or an average of \$7.42 per ton, as compared with shipments in 1919 of 14,679 tons, valued at \$86,231, or an average of \$5.87 per ton.

The greater part of the feldspar shipped from Canadian mines is marketed with the pottery manufacturers in the United States. The production comes chiefly from the counties of Frontenac and Lanark, Ontario, and the counties of Ottawa and Labelle in Quebec.

The exports of feldspar during the year were 38,768 tons, valued at \$219,744.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	value
		\$		\$		\$		\$
Production (shipments)—								
Quebec.....	1,188	8,204	191	4,279	925	13,073	649	10,052
Ontario.....	18,274	81,622	18,591	108,449	13,754	73,158	37,224	270,843
	19,462	89,826	18,782	112,728	14,679	86,231	37,873	280,895
Exports.....	(a)....	69,195		101,187		104,285	38,768	219,744
Imports.....					(b) 980	15,863	1,991	44,390

(a) Not separately stated prior to April, 1917.

(b) Last 9 months.

FLUORSPAR

The production of fluorspar was double that of the previous year.

The total shipments during 1920 were 11,235 tons, valued at \$240,446, as compared with 5,063 tons, valued at \$97,837, in 1919.

Only three companies in the Madoc district reported shipments during the year, at an average value of \$18.22, as compared with an average of \$17.31 in 1919. Prices varied with the grade of the product from \$17.50 to \$20.50 per ton.

The Consolidated Mining and Smelting Company operated the "Rock Candy" fluorspar deposit on Kennedy creek, Kettle river, near Grand Forks, B.C., and reported a production nearly double that of Ontario.

The imports during the year were 6,812 tons, valued at \$113,818, while the exports were 6,900 tons, valued at \$109,683.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production—								
Ontario.....	4,249	68,756	7,187	150,779	3,425	59,281	3,758	68,475
British Columbia.....			175	5,250	1,638	38,556	7,477	171,971
	4,249	68,756	7,362	156,029	5,063	97,837	11,235	240,446
Exports.....					(a) 697	9,616	6,900	109,683
Imports—								
Hydro-fluo-silicic acid.....	0.2	97	0.5	80	2.8	747	1.2	409
Fluorspar.....					(a) 8,273	84,702	6,812	113,818

(a) Last 9 months.

GRAPHITE

The total shipments of graphite in 1920 were 2,190 tons, valued at \$165,617, and included 1,957 tons, valued at \$133,704, from Ontario, and 233 tons, valued at \$31,913, from Quebec. By grades there were 196 tons of No. 1 flake, valued at \$40,382, or an average of \$206.03 per ton; 255 tons of No. 2 flake, valued at \$28,572, or an average of \$126.99 per ton; and 1,769 tons of No. 3, and dusts, valued at \$96,663, or an average of \$54.64 per ton.

In 1919, Ontario contributed 1,340 tons, valued at \$99,821, and Quebec, 20 tons, valued at \$400.

The quantity of ore milled during the year was 5,153 tons, from which were produced 2,155 tons of milled, or refined graphite.

The Black Donald (Calabogie, Ont.) ore consists largely of amorphous graphite, from which a large mill recovery was made.

Graphite operators reported that of the total shipments, 2,029 tons, valued at \$149,606, were sold for export. Trade records show exports of graphite or plumbago, crude and refined, 2,142 tons, valued at \$159,817. The Customs exports classification was revised as from April 1, 1919, the class "plumbago, crude and concentrates" being replaced by "graphite, or plumbago, crude and refined."

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Ore milled.....	19,614		11,358		7,076		5,153	
Output, milled graphite.....	4,003		3,225		1,648		2,155	
Production (shipments)—								
No. 1 Flake.....	540	158,656	366	97,518	95	22,100	196	40,382
No. 2 Flake.....	650	99,621	73	13,780	103	14,853	225	28,572
No. 3 Flake and dust.....	2,524	144,615	2,675	137,572	1,162	63,268	1,769	96,663
	3,714	402,892	3,114	248,870	1,360	100,221	2,190	165,617
Exports—								
Crude ore and concentrates.....	112	7,455	664	32,710				
Crude and refined.....					1,000	72,917	2,142	159,817
Manufactures (a).....		384,505		205,993	(b)	3,970		(b)
Imports—								
Plumbago, not ground.....		47,218		93,956		6,604		4,352
Ground and manufactures.....		123,991		132,821		80,970		102,568
Crucibles: clay, or plumbago.....		798,044		113,856		59,239		176,717
		969,253		340,633		146,813		283,631

(a) The entries under this item are believed to be chiefly refined graphite.

(b) First three months only. No entries under this class since April, 1919.

Artificial Graphite.—Artificial graphite is manufactured in electric furnaces at Niagara Falls, Ont., by the International Acheson Graphite Company. The annual production has been as follows:—

Calendar Year	Pounds	Calendar Year	Pounds	Calendar Year	Pounds
1906.....	445,047	1911.....	2,172,098	1916.....	525,048
1907.....	407,779	1912.....	2,302,625	1917.....	1,096,172
1908.....	428,540	1913.....	2,184,472	1918.....	1,808,698
1909.....	513,436	1914.....	1,234,239	1919.....	358,524
1910.....	2,442,166	1915.....	497,271	1920.....	207,180

GYPSUM

The total quantity of gypsum rock quarried in 1920 was 460,020 tons, of which 148,864 tons were calcined. The shipments of all grades totalled 429,144 tons, valued at \$1,893,991, and included: lump gypsum, 262,442 tons, valued at \$457,158; crushed, 48,379 tons, valued at \$146,947; fine ground, 6,615 tons, valued at \$46,584, and calcined, 111,708 tons, valued at \$1,243,302. By provinces the shipments were: Nova Scotia, 260,661 tons, valued at \$573,752; New Brunswick, 49,405 tons, valued at \$428,183; Ontario, 74,707 tons, valued at \$404,162; and Manitoba, 44,371 tons, valued at \$487,894.

The average number of men employed in 1920 was 1,016 and wages paid \$955,602, as compared with 725 men employed and \$380,105 paid in wages in 1919.

Exports of crude gypsum were 244,428 tons, valued at \$413,522, and of gypsum ground, 12,576 tons, valued at \$232,736.

The imports of gypsum of all grades during 1920 were valued at \$78,302 and included: crude gypsum, 2,294 tons, valued at \$25,477; ground gypsum, 118 tons, valued at \$3,966; and plaster of Paris, 2,822 tons, valued at \$48,859.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Ore, mined.....	365,659	.....	155,298	.....	303,998	.....	460,020	.....
Ore, calcined.....	97,667	.....	88,748	.....	121,496	.....	148,864	.....
Production: <i>by grades</i> :—								
Lump.....	223,760	246,774	43,728	47,727	172,781	206,858	262,442	457,158
Crushed.....	32,305	51,869	25,074	55,079	27,939	68,002	48,379	146,947
Fine ground.....	4,843	19,222	4,558	12,621	3,842	18,901	6,615	46,584
Calcined.....	75,424	564,119	78,927	707,579	94,501	921,526	111,708	1,243,302
	336,332	881,984	152,287	823,006	299,063	1,215,287	429,144	1,893,991
Production: <i>by Provinces</i> :—								
Nova Scotia.....	215,472	301,261	49,365	115,976	163,852	250,174	260,661	573,752
New Brunswick.....	38,556	191,631	27,225	214,114	42,409	315,656	49,405	428,183
Ontario.....	48,947	130,138	38,214	151,564	59,899	278,120	74,707	404,162
Manitoba.....	33,347	258,934	37,483	341,352	32,903	371,337	44,371	487,894
British Columbia.....	10	20						
Exports—								
Crude.....	224,423	245,182	67,824	80,843	148,394	199,857	244,428	413,522
Ground.....		146,384		101,618		140,235	12,576	232,736
		391,566		182,461		340,092		646,258
Imports—								
Crude.....	64	999	112	2,015	1,238	22,556	2,294	25,477
Ground.....	282	5,355	79	1,836	85	2,695	118	3,966
Plaster of Paris.....	3,101	29,106	1,095	18,214	1,525	22,204	2,822	48,859
	3,447	35,460	1,286	22,065	2,848	47,455	5,234	78,302

MAGNESITE

The production of magnesite obtained from the deposits in Argenteuil county, Quebec, is marketed as crude magnesite, calcined, and dead burnt clinker (the latter being sintered in rotary kilns after mixture with about 5 per cent of iron ore in the form of magnetite). The total shipments in 1920 were 18,378 tons, valued at \$512,756, as compared with shipments in 1919 of 11,273 tons, valued at \$328,465.

There were marketed about 4,296 tons of crude magnesite, valued at \$39,779, averaging about \$9.26 per ton. Calcined material sold at from \$20 to \$22 per ton and dead burnt clinker averaged \$37.50 per ton.

In 1920 about 31,040 tons of magnesite rock were quarried and about 30,230 tons were calcined in lime-kilns, or sintered in rotary cement kilns. The sintering was done at Calumet and Grenville, Que.

Exports of magnesite in 1920 were 11,014 tons, valued at \$426,710, consisting of 155 tons crude, valued at \$1,662, and calcined, or dead burned material, 10,859 tons, valued at \$425,048.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Crude magnesite mined.....	64,767	.....	57,799	.....	14,952	.....	31,040	.....
Crude magnesite calcined.....	11,401	.....	49,303	.....	12,214	.....	30,230	.....
Production—								
Crude magnesite.....	52,711	528,260	16,697	158,380	1,638	14,664	4,296	39,779
Calcined.....	.....	.....	.....	.....	.....	.....	3,154	61,402
Dead burnt.....	5,379	200,015	22,668	858,385	9,635	313,801	10,928	408,575
	58,090	728,275	39,365	1,016,765	11,273	328,465	18,378	512,756
Exports.....	(c)	72,228	.....	816,553	.....	425,892	(b)	11,014
Imports—								
Magnesia.....	58	16,186	47	13,200	183	61,740	287	84,339
Magnesite.....	.....	.....	.....	.....	(c) 886	21,734	1,521	49,799

(b) Consisting of 155 tons crude valued at \$1,662; balance, calcined product. (c) Last 9 months.

Metallic Magnesium.—The manufacture in Canada of metallic magnesium was carried on for a few years during the war by the Shawinigan Electro Metals Company, Limited, at Shawinigan Falls, Que., the metal being made from imported magnesium chloride salts.

Magnesium Sulphate.—Sulphate of magnesium, epsomite, or crude Epsom salt, has been found in several localities in southern British Columbia.

Commercial shipments were made during the past few years by the Stewart-Calvert Company, Inc., of Oroville, Washington, from a deposit near Kruger mountain, Osoyoos division, B.C., where the mineral is found in a flat depression known as Spotted lake, which is a partially dried-up lake containing alternate circles of water and dry places. The crude magnesium sulphate salt is hauled to the company's works at Oroville, where the crude salt is refined and prepared for the market. This deposit was not operated in 1920. In addition to this deposit, the same company owns another near Clinton, in Lillooet, B.C., from which the 1920 shipments were made.

Several lakes containing these salts have been observed on the Basque ranch, near Ashcroft. Following investigations of their probable commercial value shipments were made in 1920 by the Basque Chemical Production Company, Limited.

The greater part of the refined salt is used for industrial purposes, the tanning industry taking the largest proportion, though considerable amounts are also used in the textile industries and in the manufacture of dyes. About 20 per cent of the total shipments go to the drug trade.

During the year 743 tons, valued at \$3,737, were exported, while the imports were valued at \$72,709.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Quantity extracted.....	2,600	.....	4,500	.....	.....	.....	2,056	.....
“ shipped.....	929	4,645	1,949	14,565	738	9,115	1,947	39,886
Exports.....	.....	.....	.....	.....	.....	15	743	3,737
Imports.....	.....	.....	.....	.....	(a)	54,779	.....	72,709

(a) Not separately classified prior to April, 1919.

MANGANESE ORE

The production of manganese ore in Canada has been small and irregular. During 1920 operations were continued at New Ross, in Nova Scotia, but the bulk of the reported shipments for the year were, however, made from the Hill 60 group of claims near the village of Cowichan Lake, Vancouver island.

The manganese ores which have been mined in eastern Canada are pyrolusite, manganite, psilomelane, and bog manganese. These were mostly ores with a high manganese content, and fairly free from deleterious constituents. The largest part of the production was consequently put to those uses, where a high-grade raw material is desired, e.g., as an oxidizing agent in the manufacture of chlorine, bromine, manganates, and permanganates; as a decolorizer of glass, porcelain, and enamels; as a colouring material in dyeing and pottery and paint manufacture; as a drier in paints and varnishes, and in the manufacture of dry and Leclanche cells, etc.

The first shipments of manganese ore from British Columbia were made in 1918 from deposits near Kaslo. These consist mainly of wad, or bog manganese.

At the Cowichan Lake deposits, Vancouver island, "Manganese ore of merchantable value is found as a mixture of secondary oxides, principally pyrolusite, psilomelane, and magnetite, derived from the alteration of rhodonite, the silicate of manganese, which occurs in strong outcrops throughout the manganiferous area. On Hill 60 claim, oxidation of the silicate has taken place on a considerably larger scale than on some of the other claims, resulting in outcrops of hard and massive oxides containing from 15 to 57 per cent metallic manganese."

Shipments from these deposits have been made to the Bilrowe Alloys Company, of Tacoma, Wash., U.S.A.

No separate record of imports of manganese ore is kept in the Trade classification but statistics of oxide of manganese are given. In 1920 these imports were 1,510 tons, valued at \$93,062. Imports of ferro-silicon, spiegeleisen and ferro-manganese in 1920 were 7,908 tons, valued at \$1,324,061. The exports of manganese ore in 1920 were 640 tons, valued at \$19,921.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production—								
Nova Scotia.....	158	14,836			45	3,600	62	4,140
British Columbia.....			440	6,230	616	10,559	587	6,889
	158	14,836	440	6,230	661	14,159	649	11,029
Imports—								
Manganese oxide.....	1,769	92,616	1,068	93,477	2,082	89,314	1,510	93,062
Ferro-silicon, spiegeleisen and ferro-manganese..	12,828	2,029,990	35,284	4,283,133	4,383	901,678	7,908	1,324,061
Exports—								
Manganese ore.....	185	16,031	784	29,208	603	13,401	640	19,921
Ferro-silicon and com- pounds.....	33,212	2,616,924	23,781	2,671,434	22,449	1,229,341	25,422	1,297,720

MICA

The total shipments of mica by mine operators in 1920 were 2,203 tons, valued at \$376,022. By provinces the production was: from Quebec, 737 tons, valued at \$281,460; Ontario, 1,466 tons, valued at \$94,562.

The statistics as to the value of production should be considered with due regard to the conditions under which the industry is conducted. The condition in which mica is shipped from the mines varies greatly; one operator may ship his output cleaned and trimmed, while the output of another is in a rough cobbled state, with consequent noteworthy difference in prices realized. And, further, companies operating trimming shops as well as mines may place only a nominal value on shipments from mines to trimming shops.

Canada's production of mica has come exclusively from two fields: one in the province of Quebec, a short distance north of the city of Ottawa, and the other embracing parts of the counties of Lanark, Leeds and Frontenac, in the province of Ontario. The city of Ottawa (and the adjacent city of Hull), lying between these two fields, is the centre to which almost all the production of the various mines and numerous small prospects is shipped for trimming, grading, and marketing. In preparation for the market a considerable proportion of the tonnage received is cobbled out and the mica split, trimmed and otherwise manufactured, with the result that the exports, though usually of smaller tonnage than the shipments from the mines, exceed them in total value.

According to "Trade" records the exports of mica in 1920 were 3,303 tons, valued at \$824,107.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production—								
Quebec.....	774	286,730	481	229,119	2,429	218,437	737	281,460
Ontario.....	392	72,121	266	42,431	325	55,351	1,466	94,562
	1,166	358,851	747	271,550	2,754	273,788	2,203	376,022
Exports—								
Cobbled.....					(a) 100	100,942		
Splittings.....					(b) 108	214,227	42	55,724
Scrap and waste.....	636	451,345	433	410,000	(b) 350	314,238	522	725,946
Plate and manufactures					(b) 2,182	11,959	2,739	33,963
					(b) 596	596		8,474
		451,345		410,000		641,962		824,107

(a) First 3 months. (b) Last 9 months.

MINERAL PIGMENTS (IRON OXIDES)

For many years there has been an annual production in the province of Quebec of iron oxide from deposits situated between Champlain and Three Rivers, a short distance from the St. Lawrence river.

These oxides are marketed after calcining, as paint materials, and are also sold crude for use in the purification of illuminating gas. The mineral paint is calcined, washed, and fine ground before shipment.

There was a small production, included in the totals for 1917, 1919 and 1920, of zinc oxide for use as a pigment, the production being obtained at the oxide plant of the Canadian Zinc Products Company, Limited, at Notre-Dame-des-Angeles.

The total production of iron oxides in 1920 was 19,128 tons, valued at \$157,909.

The exports of mineral pigments, iron oxides, ochres, etc., in 1920, are reported as 1,528 tons, valued at \$78,913.

Imports of mineral pigments are included under two classifications: (1) ochres and ochrey earths, siennas and umbers, duty 20 per cent, and (2) oxides, roughstuffs, fillers, fireproofs and colours, dry, n.e.s., duty 25 per cent. During 1920 imports under the first classification were 3,231 tons valued at \$182,997, and under the second 3,567 tons, valued at \$619,923, or a total import of 6,793 tons, valued at \$802,920.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Production.....	9,409	\$ 87,605	17,317	\$ 112,440	11,862	\$ 113,427	19,128	\$ 157,909
Imports—								
Ochrey earths.....	1,956	59,864	1,560	66,011	1,297	65,744	3,231	182,997
Oxides.....	2,538	357,638	2,460	409,841	3,378	518,780	3,567	619,923
Exports: (a).....	1,451	30,052	769	18,377	767	25,229	1,528	78,913

(a) Mineral pigments, iron oxides and ochres.

MINERAL WATER

The statistics of production given herewith represent as usual, as closely as can be ascertained, the value of mineral water shipped from mineral springs in bottles, barrels, or other containers, and do not include any estimate of the value of the mineral water used at springs for drinking or bathing purposes; nor are the natural pure spring waters included, of which a considerable quantity is sold in bottled form.

The value of the production in 1920 was \$24,582, as compared with \$71,015 in 1919; of the 1920 production Quebec is credited with \$10,109, and Ontario, \$14,473.

The imports of mineral and aerated waters during the calendar year 1920 were valued at \$178,511, being 358 gallons of natural mineral water, valued at \$405; and aerated water valued at \$178,106. The exports of mineral water were valued at \$12,796, of which three gallons, valued at \$2, were for natural mineral water, and \$12,794 for bottled aerated water.

	1917	1918	1919	1920
	Value	Value	Value	Value
Production.....	\$ 145,814	\$ 154,468	\$ 71,015	\$ 24,582
Imports.....	108,444	105,967	113,743	178,511
Exports.....	10,765	20,214	59,669	12,796

NATURAL GAS

The total production of natural gas in Canada in 1920 was 16,845,518 thousand cubic feet, valued at \$4,232,642, of which Ontario contributed 10,529,374 thousand cubic feet, valued at \$2,920,731; Alberta, 5,633,442 thousand cubic feet, valued at \$1,181,345; and New Brunswick, 682,502 thousand cubic feet, valued at \$130,506.

The value of the gas, as reported by producers, varies from 5 cents to 30 cents per thousand feet, but these prices do not represent what the consumer has to pay. In some cases the producer also owns the distribution pipe line and receives the full price paid by the consumer. In other cases the producer may sell to a pipe line company who either sells directly to consumers, or may in turn resell to other pipe line companies for retail distribution; in such cases as these the producer receives only a fraction of the amount paid by the consumer, but he is saved the expense of distribution. The statistics given herewith represent, as far as possible, the value received by the producer, or owner, of the gas well, whether such producer be the owner of the distribution line or not.

Natural Gas Production, 1917-18-19

	1917		1918		1919	
	M cu. ft.	Value	M cu. ft.	Value	M. cu. ft.	Value
		\$		\$		\$
Production—						
New Brunswick.....	796,775	103,735	792,396	107,842	682,890	120,510
Ontario.....	19,868,035	3,641,587	13,029,524	2,884,460	11,024,041	2,690,400
Alberta.....	6,744,130	1,299,976	6,318,389	1,358,638	8,230,838	1,365,127
Total.....	27,408,940	5,045,298	20,140,309	4,350,940	19,937,769	4,176,037

Natural Gas Production, 1920

Province	No. of operators	No. men	Wages	Wells, 1920						Production		
				(a)	(b)	(c)	(d)	(e)	(f)	M cu. ft.	Value	Average
			\$								\$	\$
New Brunswick.....	1	17	33,729	23	.....	.....	2	21	.....	682,502	130,506	0.191
Quebec.....			* 6	.....	.....	.....	.....	6	.....		
Ontario.....	86	494	461,916	1872	93	24	117	1862	12	10,529,374	2,920,731	0.277
Manitoba.....	1		.....	1	.....	.....	.....	1	.....	200	60	0.30
Alberta.....	16	105	147,675	67	.....	2	3	64	3	5,633,442	1,181,345	0.21
Total.....	104	616	643,320	1969	93	26	122	1954	15	16,845,518	4,232,642	0.251

(a) Total number of productive wells at beginning of year.

(b) Number of productive wells drilled during year.

(c) Number of dry wells drilled during year.

(d) Number of wells abandoned during year.

(e) Number of productive wells at end of year.

(f) Number of wells on which drilling was in progress at end of year.

*Idle.

PEAT

During the year two bogs were operated, one in Bruce county, and the other at Alfred, both in Ontario. About 6,300 tons were manufactured, while shipments were reported as 4,550 tons, valued at \$18,650.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production.....					986	6,561	4,550	18,650

PETROLEUM

A bounty of 1½ cents per gallon is paid on the marketed production of crude oil from Canadian oil-fields, the administration of the "Petroleum Bounty Act" being under the Department of Trade and Commerce. According to the bounty record the production in 1920 in Ontario was 180,071 barrels (6,302,477 imperial gallons), which at the average price per barrel of \$4.03½ was worth \$726,286. The New Brunswick production was 5,148 barrels, worth about \$19,963, or an average value of \$3.88. For several years there has been a small but growing production of crude petroleum in Alberta, the greater part of which, however, does not earn the bounty because of its lightness, or low specific gravity. The approximate production in 1920 was 11,032 barrels, valued at \$75,986.

The total production in Canada from all sources was therefore 196,251 barrels (6,868,785 imperial gallons), valued at \$822,235.

The price of crude oil at Petrolia was quoted at \$3.54, January, 1920, \$3.63 in February, \$4.06 in March, and \$4.13 in April, which price remained firm to end of the year. The average monthly price was therefore \$4.03½ as compared with \$2.85 in 1919, \$2.69 in 1918, \$2.33 in 1917 and \$1.98 in 1916.

The production (in barrels) of the various fields in the province of Ontario, as kindly furnished by the Supervisor of Petroleum Bounties at Petrolia, was as follows: Petrolia and Enniskillen, 65,082; Oil Springs, 39,388; Moore township, 7,037; Sarnia township, 3,495; Plympton township, 531; Bothwell, 26,564; Tilbury East, 623; West Dover, 12,171; Raleigh township, 488; Dutton, 837; Onondaga, 341; Mosa township, 24,063; Thamesville, 1,131.

The production in New Brunswick is all obtained in the Stoney Creek district, Albert county. The Alberta production was obtained from six wells situated in the Turner Valley field, near Black Diamond, and about 35 miles southwest of Calgary.

In 1920, ten oil refineries in Canada used 294,479,064 gallons of crude oil, of which 288,076,946 gallons were imported and 6,402,118 gallons were obtained from Canadian wells. The production of refined oils and petroleum products included: gasolene and motor oils, 83,890,326 gallons; benzoline, benzine, and other light oils, 5,701,558 gallons; illuminating oils, 54,155,655 gallons; lubricating oils, 21,890,082 gallons; gas and fuel oils and tar, 88,248,396 gallons; wax and candles, 10,398,126 pounds; petroleum coke, 67,054,149 pounds. There was also a production of asphalt and other products amounting to \$1,715,087. The total value of the products of refineries was \$57,347,479.

According to inspection returns of the Inland Revenue Department the total quantity of illuminating oils inspected during the calendar year 1920 was 58,940,118 gallons, and the quantity of naphtha or gasolene and other light oils was 99,826,802 gallons.

Exports of petroleum entered as crude mineral oil in 1920 were 2,684,427 gallons, valued at \$293,325, and of refined oil, 1,243,335 gallons, valued at \$205,999. There was also an export of naphtha or gasolene of 160,433 gallons, valued at \$59,432.

The total value of the imports of petroleum and petroleum products in 1920 was \$47,786,550, as against a value of \$30,077,722 in 1919.

In 1920, the total petroleum oils, crude and refined, imported were 491,372,140 gallons, as compared with 451,303,731 gallons in 1919. A detailed record will be found in the accompanying tables.

Oil Wells and Oil Shipments, 1920

Province	Men employed	Wages paid	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Oil Shipped (h)		
										Barrels	Value	Average value
New Brunswick.....	*	\$ *	6	1	...	3	3	9	...	5,148	\$ 19,963	\$ 3.88
Ontario (not complete)...	198	176,206	3,139	56	2	6	353	3,015	4	180,071	726,286	4.03½
Manitoba.....												
Alberta.....	4	6,581	5	6	...	1	1	5	16	11,032	75,986	6.89
British Columbia.....		Dev.		4	...		2		5			
Total.....	202	182,787	3,150	67	2	10	359	3,029	26	196,251	822,235	4.19

*Included with natural gas statistics.

(a) Number of productive wells at beginning of year.

(b) Number of oil wells drilled during year.

(c) Number of gas wells drilled during year.

(d) Number of dry wells drilled during year.

(e) Number of wells abandoned during year.

(f) Total number of productive wells at end of year.

(g) Number of wells on which drilling was still in progress at end of year.

(h) Record of oil shipments for Ontario based on bounty payments.

Petroleum

	1917		1918		1919		1920	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Bounty paid.....		\$ 107,799		\$ 153,958		\$ 119,714		\$ 97,700
Production crude—								
New Brunswick.....	2,341	5,460	3,009	7,402	4,225	13,141	5,148	19,963
Ontario.....	202,991	473,477	288,692	777,737	219,804	625,342	180,071	726,286
Alberta.....	8,500	63,302	13,040	100,004	16,437	97,841	11,032	75,986
Production refinery—	213,832	542,239	304,741	885,143	240,466	736,324	196,251	822,235
Refined oils.....	173,235,606	23,575,358	232,469,829	35,372,773	258,455,395	40,484,222	253,886,017	54,363,183
Other products (n).....		1,661,785		1,915,088		2,371,852		2,984,296
Refined oils inspected*—		25,137,143		37,287,861		42,856,074		57,347,479
Petroleum.....	41,366,586		55,443,056		63,480,214		58,940,118	
Naphtha.....	59,892,046		74,310,352		97,519,950		99,826,802	
Exports—	101,258,632		129,753,408		161,000,164		158,766,920	
Coal and kerosene, crude.....	2,130	183	270,302	28,415	603,478	40,648	2,684,427	293,325
Coal and kerosene, refined.....	28,212	6,558	1,946,967	206,675	2,846,293	287,170	1,243,335	205,999
Gasoline and naphtha.....	24,304	7,419	91,229	28,778	1,566,707	428,754	160,433	59,432
Imports—	54,646	14,160	2,308,498	263,868	5,016,748	756,572	4,088,195	558,756
(a) Crude (1) for refining.....	183,105,102	8,411,730	229,010,561	13,359,636	305,748,960	15,104,287	290,736,366	20,814,899
Crude (2) all other.....	142,524,473	5,958,930	148,537,043	8,355,387	99,559,068	4,702,771	122,750,650	7,790,137
(b) For use in ore treatment, etc.....	909	118	4,710	1,922	42,085	1,367	16,249	1,344
(c) Crude gas oils.....	854,778	65,404	65,845	7,584	155,145	23,866	178,641	28,869
(d) Coal and kerosene, distilled.....	13,258,815	978,366	5,241,881	526,606	6,757,159	926,822	14,971,509	2,359,021
(e) Illuminating.....	198,281	115,194	205,839	152,825	156,126	119,565	176,340	127,889
(f) Lubricating.....	3,438,430	559,605	2,450,588	476,641	1,436,809	289,442	881,102	175,478
(g) Lubricating, n.o.p.....	1,877,381	650,325	2,849,651	1,203,130	3,430,183	1,467,593	4,376,192	2,267,611
Gasoline.....	15,369,172	3,293,760	3,121,982	796,387	4,391,607	1,142,855	8,515,545	2,404,488
(h) Products, n.o.p.....	18,521,574	2,708,395	29,246,143	5,595,425	29,516,589	5,615,622	48,769,546	10,891,302
	379,148,915	22,741,827	420,733,643	30,477,543	451,303,731	29,394,190	491,372,140	46,861,638

Petroleum—Continued

	1917		1918		1919		1920	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Paraffin wax..... Lbs.	1,620,634	\$ 140,722	1,755,422	\$ 209,916	844,838	\$ 108,049	1,455,939	\$ 168,521
Paraffin wax, candles..... "	513,337	75,257	327,657	64,033	297,419	59,151	264,794	68,173
Grease, axle..... Lbs.	2,133,971	215,979	2,083,079	273,949	1,142,257	167,200	1,720,733	236,694
Vaseline and similar preparations of petroleum..... "	5,827,746	335,379	5,333,432	401,988	3,927,278	357,495	4,754,633	467,109
		65,765		152,694		158,037		221,109

(a) (1) Crude petroleum in its natural state .7900 specific gravity or heavier at 60 degrees temperature, when imported by oil refineries to be refined in their own factories. (2) Petroleum (not including crude petroleum imported to be refined, or illuminating or lubricating oils) .8235 specific gravity or heavier at 60 degrees temperature.

(b) Crude petroleum, gas oils (other than benzene, naphtha and gasoline).

(c) Coal and kerosene, distilled, purified, or refined.

(d) Illuminating oils composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon.

(e) Lubricating oils composed wholly or in part of petroleum, costing less than 25 cents per gallon.

(f) Products of petroleum, n.o.p.

(g) Petroleum imported by miners or mining companies or concerns for use in the concentration of ores of metals in their own establishments.

(h) Including wax, candles, and asphalt. In 1919 and 1920, this item included petroleum coke also. (See table following).

* Department of Inland Revenue returns.

Oil Refinery Production

		1919		1920	
		Quantity	Value	Quantity	Value
			\$		\$
Number of men employed: wages.....	No.	4,082		3,869	6,014,037
Crude oil receipts—					
Canadian.....	Gal.	8,179,865	752,161	6,612,826	839,717
Imported.....	"	303,557,828	24,497,369	296,725,320	35,471,040
		311,737,693	25,249,530	303,338,146	36,310,757
Materials used—					
Crude oil, Canadian.....	Gal.	7,705,053		6,402,118	
Crude oil, imported.....	"	292,281,146		288,076,946	
Sulphuric acid.....	Lb.	52,010,125		47,981,510	
Soda and alkali.....	"	2,440,732		2,806,174	
Litharge.....	"	87,195		204,423	
Sulphur.....	"	32,303		66,666	
Other material.....	"	392,976		238,840	
Output—					
Gasoline and motor oils.....	Gal.	87,248,413	23,162,889	83,890,326	27,598,386
Benzoline, benzene and other petrol spirits..	"	4,516,783	883,194	5,701,558	1,411,360
Illuminating.....	"	55,360,322	8,301,042	54,155,655	10,887,976
Lubricating.....	"	16,113,694	3,174,318	21,890,082	4,945,640
Fuel and gas oils, tar.....	"	95,216,183	4,962,779	88,248,396	9,519,821
Wax and candles.....	Lb.	11,271,993	1,044,798	10,398,126	971,805
Other solids.....			(a) 1,327,054		(a) 2,012,491
Total.....			42,856,074		57,347,479
Crude equivalent of stocks on hand Dec. 31....	Gals	68,883,671		76,122,660	

(a) In 1919 includes 113,514,982 pounds petroleum coke valued at \$426,025 and in 1920 includes 67,054,149 pounds petroleum coke valued at \$297,404.

PHOSPHATE

The small production of phosphate, or apatite, which has been obtained in Canada since 1886 has been produced almost altogether as a by-product in connexion with the mining of mica. There were no shipments during 1920.

Phosphate is used at Buckingham, Que., in the manufacture of phosphorus and ferro-phosphorus, and the main supply of ore is obtained from Florida.

	1917		1918		1919		1920.	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production—								
Quebec.....	123	1,230	140	1,200	22	300		
Ontario.....	26	256			2	31		
	149	1,486	140	1,200	24	331	0	0
Exports-Phosphate rock...	14	200			48	741	76	645
Imports—								
Phosphate rock (fertilizer).....		62,543		90,363		30,267	13,476	114,480
Acid phosphate (a).....	1,440	209,298	1,558	302,424	1,423	295,387	1,728	369,105
Phosphorus.....	36	34,519	37	35,125	24	19,928	43	49,699
Phosphor, tin and bronze.....		50,709		46,554	62	61,647	124	120,720
Manufactured fertilizers.....		1,045,140		670,364		651,832		1,241,360
Superphosphate (b).....						178,292		470,970

(a) Probably refined phosphate of lime and phosphate of soda.

(b) Separately classified as from April 1, 1919; formerly included under manufactured fertilizers.

PYRITES

In 1920 the shipments of pyrites as sulphur ore from Canadian mines were slightly lower in point of tonnage than in the previous year. The total shipments were 174,744 tons, valued at \$719,110, and included 14,817 tons, valued at \$44,451, from the province of Quebec; 148,652 tons, valued at \$618,283, from the province of Ontario; and 11,275 tons, valued at \$56,376 from the province of British Columbia. The total sulphur content of shipments was 67,608 tons, or an average of 38.7 per cent.

The principal shipments were obtained from the same sources as in the previous year. In Quebec, cupriferous ores were shipped from Weedon mine in the Eastern Townships. In Ontario the largest shippers for export were the mines at Goudreau, on the Algoma Central railway, in Michipicoten district, and at North Pines, on the Canadian National railway, northwest of Port Arthur. Mines shipping for domestic consumption were the Helen, in Michipicoten, the Sulphide, the Queensboro, and the Clyde Lake. In British Columbia shipments were made from the Sullivan mine at Kimberley to the sulphuric acid plant at Trail, and from Anyox to the acid plant at Barnet, B.C.

Customs records show exports of pyrites during 1920 as 119,136 tons, valued at \$458,403. These figures are much less than those reported directly by the operators, and it is possible that some of the exports from Quebec may be entered as a copper ore. The imports of brimstone, or sulphur in roll or flour were 144,733 tons, valued at \$2,113,713.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production—								
Quebec.....	122,882	501,351	124,871	507,802	52,746	203,222	14,817	44,451
Ontario.....	288,058	1,080,866	268,507	1,133,963	117,011	285,832	148,652	618,283
British Columbia.....	5,709	28,545	18,238	63,454	6,730	33,650	11,275	56,376
	416,649	1,610,762	411,616	1,705,219	176,487	522,704	174,744	719,110
Sulphur content.....	155,453		154,269		65,674		67,608	
Exports.....	279,646	974,200	240,453	949,067	89,089	388,508	119,136	458,403
Imports—								
Brimstone or sulphur in roll or flour.....	82,445	1,515,309	92,062	2,058,811	56,062	1,015,223	144,733	2,113,713

Sulphuric Acid.—Sulphuric acid is manufactured in different grades or strengths, and in recording statistics of production it is desirable for purposes of comparison that the quantities of the several grades should be reduced as far as possible to a uniform standard.

Production records have been obtained in terms of the standard grades of 50° Bé., 60° Bé., 66° Bé., and stronger acids. The quantities of the first two grades have, however, in the following statistics been reduced to their equivalent in 66° Bé., acid.

Exports of sulphuric acid during 1920 were 10,433,900 pounds, valued at \$89,992. Imports of sulphuric acid in 1920 were 320 tons, valued at \$22,664.

	1917		1918		1919		1920	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$		\$
Ore used—								
Sulphur..... Tons	25,994		25,552		2,245		13,534	
Pyrites..... “	66,128		75,941		54,879		44,398	
Production..... * “	153,530		190,621		63,596		82,811	
Imports..... “	216	15,680	5,954	208,288	1,437	38,759	320	22,664
Exports..... “	9,478	197,888	5,600	165,579	5,447	108,392	5,217	89,992

*Expressed in terms of 66° Bé acid. Record includes a small production of oleum and other grades, the strength of which is not specified. An approximate estimate of production in terms of 50° acid will be obtained by increasing these figures by 50 per cent.

QUARTZ (SILICA)

The statistics of quartz, or silica production given in the tabulated statement herewith include chiefly the quartz, or quartzite used in the smelting of nickel and copper ores, in the manufacture of ferro-silicon, and in the manufacture of sanitary ware, or earthenware. Production of silica in the form of infusorial earth has already been included under tripolite, and a small production of silica in the form of crushed sandstone used in the manufacture of glass and for foundry work in steel plants is included in the statistics of sandstone production. The quantities in the form of silica brick are included under refractories.

The total shipments of quartz, or quartzite, in 1920 were 128,295 tons, valued at \$467,821.

Imports of silex, a finely ground quartz, in 1920 were 1,154 tons, valued at \$26,097, and the imports of flint were 9,047 tons, valued at \$170,355.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production—								
Quebec.....	550	1,788	1,730	5,383	2,221	7,773	1,986	5,558
Ontario.....	177,983	362,251	216,539	474,772	60,055	179,549	90,433	321,063
British Columbia.....	37,755	132,143	49,886	149,658	32,715	340,313	35,876	141,200
	216,288	496,182	268,155	629,813	94,991	527,635	128,295	467,821
Imports—								
Silex.....	851	12,812	607	12,054	641	13,825	1,154	26,097
Flint.....	3,774	64,292	5,749	109,825	5,411	100,902	9,047	170,355

SALT

The total sales of salt in 1920, including the salt equivalent of brine used for chemical manufacturing, were 209,855 tons, valued at \$1,544,724. These values as far as possible exclude the value of packages, which amounted to \$753,763. By grades the production included: table and dairy, 42,475 tons; common fine, 39,700 tons; common coarse, 122,628 tons; and land salt, 5,052 tons.

The number of men employed in 1920 was 345; wages paid, \$472,031

The Canadian production was obtained almost entirely from the salt field in southern Ontario. Some years ago there was a small production from brines near Sussex, New Brunswick, and at lake Winnipegosis in Manitoba. The deposit of salt rock opened up in the neighbourhood of Malagash, Cumberland county, Nova Scotia, continued development work during 1917 and shipped over 3,600 tons in 1920. This is the first known discovery of rock salt in the Maritime Provinces, and the first in Canada to be discovered at a depth sufficiently shallow to allow it to be won economically by actual mining.

The exports of salt in 1920 were 303 tons, valued at \$9,181. The imports of salt were 155,646 tons, valued at \$1,434,687, and included: 54,338 tons of fine salt in bulk, valued at \$356,389; 28,712 tons of salt in packages, valued at \$446,671; and 72,596 tons of salt imported from Great Britain, or any British possession for the use of fisheries, valued at \$631,627.

The calculated consumption of salt in 1920 was 365,798 tons, valued at \$2,970,230 (the value of the imported salt being that at point of origin).

Caustic soda and chloride of lime are manufactured by the Canadian Salt Company at their chemical works at Sandwich, Ont. The Brunner-Mond Canada, Ltd., Amherstburg, Ont., manufacture soda ash.

The imports of salt cake (sodium sulphate) in 1920 were 42,974 tons, valued at \$958,628; soda ash (sodium carbonate), 7,458 tons, valued at \$372,936; sal soda, 5,064 tons, valued at \$200,788; and chloride and hypochlorite of lime, 19,529 tons, valued at \$1,179,663.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production—								
Table and dairy.....	34,252	.....	34,324	.....	34,396	.....	42,475	.....
Common, fine.....	65,117	.....	54,210	.....	47,571	.....	39,700	.....
Common, coarse.....	37,398	.....	41,152	.....	64,426	.....	122,628	.....
Land salt.....	2,142	.....	2,041	.....	1,908	.....	5,052	.....
Total*.....	138,909	1,047,792	131,727	1,285,039	148,301	1,397,929	209,855	1,544,724
Value packages.....		403,879		574,033		573,795		753,763
Stocks on hand, Dec. 31..	2,024	.....	2,775	.....	2,974	.....	5,481	.....
Exports.....	(a)	.....	893	16,743	617	14,573	303	9,181
Imports—								
Fine, in bulk ¹	44,973	184,792	51,450	294,676	51,941	289,109	54,338	356,389
In bags, barrels ²	12,293	120,665	13,941	156,736	33,173	467,581	28,712	446,671
All other ³	113,550	782,748	100,103	815,757	62,292	553,439	72,596	631,627
	130,816	1,088,205	165,494	1,267,169	147,406	1,310,129	155,646	1,434,687
Consumption of salt.....	269,725	2,135,997	296,328	2,535,465	295,090	2,693,485	365,798	2,970,230

*Quantity sold or used; value excludes packages. (c) Estimated.

Duty 5c. per 100 pounds; ²Duty 7½c. per 100 pounds; ³Free—Imported for use of fisheries.

(a) Correct figures not available.

TALC

The total shipments of crude and ground talc by mine operators during 1920 were 21,671 tons, valued at \$166,934. A considerable portion of the shipment of crude mineral included above is ground at Madoc, and the total shipments of ground talc during 1920 were 19,610 tons of varying grades, having an average value of about \$15.49 per ton, as compared with 15,927 tons averaging about \$14.75 in 1919. Crude talc sold at from \$4 to \$8 per ton.

The Henderson mine has been operated for some years, the greater part of the output being sold to Geo. H. Gillespie & Co., who operate a grinding mill at Madoc, the balance being exported to United States. The Connolly mine, of the Anglo-American Talc Corporation—recently changed to the Asbestos Pulp Company, Limited—was also operating, as well as the Eldorado mine of the Eldorado Mining and Milling Company. Small shipments of talc were reported from British Columbia in 1917, 1919, and 1920.

Exports of talc for the twelve months ending December 31, 1920, were valued at \$263,708, being: crude talc, valued at \$10,653; refined talc, 14,909 tons, valued at \$253,055.

Imports of talc are not being separately recorded.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production (a)—								
Crude.....	13,184	51,856	12,772	47,494	12,243	49,074	11,820	48,939
Refined.....	2,619	24,683	5,397	71,703	6,399	67,221	9,851	117,995
	15,803	76,539	18,169	119,197	18,642	116,295	21,671	166,934
Exports.....	.....	** 131,637	.....	208,301	.....	210,150	.....	263,708
Total refined sold (b)....	13,703	171,788	15,903	222,167	15,927	235,000	19,610	303,738

**Last 9 months.

(a) Mine operators' returns. (b) Product Canadian plants.

STRUCTURAL MATERIALS AND CLAY PRODUCTS

INTRODUCTORY

The subjects included under this heading comprise cement, clay products, of various kinds, such as brick, sewer pipe, and tile, pottery, etc., lime, sand-lime brick, sand and gravel, slate and stone for building and other purposes, including granite, marble, limestone, sandstone, etc.

The total value of the production of these structural products in 1920 was \$41,892,088, as compared with \$27,421,510 in 1919, \$19,130,799 in 1918, and \$19,837,311 in 1917, the increase in 1920 being \$14,470,578, or 52.8 per cent, as compared with the previous year.

The total value of this class of imports in 1920 was \$11,338,831, as against \$6,691,291 in 1919, \$8,117,394 in 1918, and \$7,901,398 in 1917.

The total exports were valued at \$3,230,167, as against \$944,273 in 1919, \$608,886 in 1918, and \$647,369 in 1917.

The apparent total consumption based upon the record of production, imports and exports, was, therefore, in 1920, valued at \$50,000,752, as compared with \$33,168,528 in 1919, \$26,639,307 in 1918, and \$27,091,340 in 1917, the increase in value of consumption in 1920 being \$16,832,224.

A summary of the production, imports, exports, and consumption of structural materials and clay products in 1920 follows:—

Structural Materials, Calendar Year 1920

—	Production	Imports	Exports	Consumption
	\$	\$	\$	\$
Cement, portland and puzzolan.....	14,798,070	130,919	2,193,626	12,735,363
Clay products.....	10,664,929	9,414,783	358,151	19,721,561
Lime.....	3,818,553	48,790	381,899	3,485,444
Sand-lime brick.....	724,918			724,918
Sand and gravel.....	4,291,067	267,950	193,503	4,365,514
Slate.....	14,200	259,173		273,373
Stone.....	7,580,351	1,217,216	102,988	8,694,579
	41,892,088	11,338,831	3,230,167	50,000,752

CEMENT

The total quantity of cement sold from Canadian cement mills in 1920 was 6,651,980 barrels, valued at \$14,798,070, or an average of \$2.22 per barrel—an increase in quantity sold of 1,656,723, barrels, or 33 per cent, and an increase in total value of \$4,995,637, or about 51 per cent.

Sales of cement from mills in Quebec in 1920 were 3,013,463 barrels, valued at \$6,545,054; in Ontario, 2,035,594 barrels, valued at \$4,377,814; and the balance from Nova Scotia, Manitoba, Alberta, and British Columbia.

The total quantity of cement made in 1920 was 6,498,550 barrels, as compared with 4,613,588 barrels in 1919, an increase of 1,884,962 barrels, or about 41 per cent.

Stocks of cement on hand January 1, 1920, were 1,089,603 barrels, and at the end of December had been reduced to 936,173 barrels.

The total imports of cement in 1920 were 115,370 hundredweight, equivalent to 32,963 barrels of 350 pounds each, valued at \$112,466, or an average of \$3.41 per barrel.

The total consumption of cement, therefore, was 5,849,276 barrels, an increase of 1,017,459 barrels.

	1917		1918		1919		1920	
	Brl.	Value	Brl.	Value	Brl.	Value	Brl.	Value
Plants—		\$		\$		\$		\$
Active: No. and capacity.....	9—28,340		10—29,275		10—30,025		13—39,025	
Idle—No. and capacity.....	17—21,890		13—18,940		11—19,000		14—19,200	
Output—								
Marl.....	96,755		86,532		110,899		(b) 86,171	
Limestone.....	4,890,500		3,331,128		4,512,689		6,412,379	
	4,987,255		3,417,660		4,613,588		6,498,550	
Sold or used.....	4,768,488	7,724,246	3,591,481	7,076,503	4,995,257	9,802,433	6,651,980	14,798,070
Stocks Dec. 31.....	1,660,406		1,480,565		1,089,970		936,173	
Imports—								
Portland.....	8,580	19,646	5,913	19,851	14,066	51,314	32,963	112,466
Manufactures.....		8,710		8,509		13,129		18,453
Exports.....		16,857		13,752	(a) 177,506	465,954	(a) 835,667	2,193,626
Consumption.....	4,777,068		3,597,394		4,831,817		5,849,276	

(a) Quantity not recorded but estimated at the rate of 75 cents per cwt. or \$2.62½ per barrel.

(b) Including puzzolan.

CLAYS AND CLAY PRODUCTS

For a number of years a small quantity of fireclay has been produced and sold as such, and during the past few years there has been a small production of kaolin, or china-clay, from a deposit in the province of Quebec. With these exceptions, the clay production in Canada consists almost altogether of the manufactured product.

The clay products made in Canada comprise brick of various kinds, including common and pressed, ornamental and fancy building brick, firebrick, silica brick, magnesite brick, porous fireproofing brick and blocks, sewerpipe and drain tile, pottery and sanitary ware, the last two products chiefly from imported clays.

The total value of the clay products sold or marketed in 1920 was \$10,664,929, as compared with a value of \$7,906,366 in 1919, \$4,583,489 in 1918, and \$4,779,038 in 1917. The value of the production in 1920 shows an increase of \$2,758,563 as compared with the previous year.

The average number of men employed in 1920 was 5,232, as compared with 4,613 in the previous year, and the total wages paid were \$5,071,645, as against \$3,356,464.

Of the total value of the sales in 1920, building brick and fireproofing contributed \$7,854,881, or about 73.5 per cent. Sewerpipe and tile production \$2,111,742, or 19.8 per cent. The total value of the production of pottery was \$1,317,193, of which \$209,171 only is estimated as attributable to Canadian clays, the balance being credited to imported clays.

The value of the production of fireclays, firebrick, silica brick, and magnesite brick from domestic clays was \$474,113, and the production of kaolin was 683 tons, valued at \$15,022.

Detailed statistics of production of the several classes of clay products by provinces in 1920, are shown in the following table:—

Province	Per cent of total value	No. of active firms reporting	No. of men employed	Wages	Common brick			Pressed brick				
					No. manu- factured	No. sold	Value of sales	Per M	No. manu- factured	No. sold	Value of sales	Per M
Nova Scotia.....	5.07	12	296	\$ 228,728	17,633,400	16,426,985	\$ 208,837	\$ 12 71	25,000	25,000	\$ 625	\$ 25 00
New Brunswick.....	0.69	6	75	49,700	2,700,000	2,273,000	36,713	16 15				
Quebec.....	22.28	20	1,033	1,065,795	123,489,041	110,689,797	1,611,169	14 56	17,148,511	13,045,215	251,693	19 29
Ontario.....	52.64	151	2,598	2,613,487	148,656,605	129,839,203	2,323,563	17 90	69,732,552	58,882,431	1,352,819	22 08
Manitoba.....	1.94	6	410	685,288	14,589,858	10,812,328	180,876	16 73	1,786,000	771,000	25,888	33 58
Saskatchewan.....	4.42	8	124	125,392	11,006,000	8,318,000	121,332	14 59	3,105,000	3,356,000	119,344	35 56
Alberta.....	7.37	11	428	496,669	23,249,030	19,818,350	272,373	13 74	9,738,714	7,725,480	200,979	26 02
British Columbia.....	5.59	9	248	288,778	5,692,060	5,165,365	81,133	15 71	1,331,999	1,331,999	53,189	39 93
Total.....	100.00	223	5,212	5,053,837	347,015,994	303,343,028	4,835,996	15 94	102,867,776	85,137,125	2,004,537	23 54

Province	Fireproofing		Ornamental brick and terra-cotta lumber		Re- fractories	Hollow building blocks		Pottery		Sewerpipe		Tiles, drain		Kaolin		Total	
	Tons	Value	No. sold	Value		No. sold	Value	Value		Tons	Value	M	Value	Value		Value	
Nova Scotia.....					\$ 60,929	32,480	4,161		\$ 14,442	265,112		70	1,750		\$ 541,114		
New Brunswick.....					1,659	400,000	35,449	36,771	9,706	254,914					73,484		
Quebec.....	10,831	130,246	2,839,000	59,188	85,582	1,406,028	107,524	10,000	28,635	860,811		92	6,689	15,022	2,376,029		
Ontario.....	22,124	301,856		61,521				56,857				13,295	462,995		5,613,488		
Manitoba.....					33,058				4,868	129,214		650	68,500		206,764		
Saskatchewan.....															471,448		
Alberta.....	16,036	159,316			293,185		39,371	105,543	1,236	39,039		132	8,848		786,430		
Br. Columbia.....							115,756					288	13,870		596,172		
Total.....	49,091	591,418	(c)	120,669 (a)	474,113		302,261 (b)	209,171	58,887	1,549,090		14,527	562,652	15,022	10,664,929		

a There was also a production of \$211,289 from imported clays. b There was also a production of \$1,108,022 from imported clays. c Of which \$46,743 is credited to terra-cotta lumber.

Clay Paving Brick.—Paving brick was formerly made in Canada, chiefly at West Toronto, Ont., from shale obtained from the banks of the Humber river, and more recently during the years 1915 and 1916 there was a small production reported from Clayburn, B.C. There was no production reported for the past four years. The annual production for a number of years varied from 3,000,000 to over 5,000,000 per season.

Drain Tile.—The total sales of drain tile in Canada as reported to this branch were 14,527 thousand, valued at \$562,652. The greater part of this production is from Ontario, the sales in this province as reported by the producers being 13,295 thousand, valued at \$462,995.

Kaolin.—The shipments of Kaolin in 1920 were 683 tons, valued at \$15,022, as compared with 759 tons, valued at \$13,744, in 1919.

The production was obtained from the deposits in the township of Amherst, Ottawa county, Quebec, operated by the Canadian China Clay Company of Toronto.

The plant for refining the clay is situated two miles from St. Remi d'Amherst, and seven miles from Huberdeau, the terminus of the Montfort branch of the Canadian National Railway, forty-six miles northwest of Montreal.

Pottery.—Sanitary porcelain is made at St. Johns, Que., and electrical porcelain is made at Hamilton and Peterborough, Ont. These are the only firms in Canada at present making white wares. The raw materials, including clays, ground quartz and feldspar are all imported.

Stoneware pottery, such as crocks, jars, churns, and jardinières, is made at Medicine Hat, Alta., from Saskatchewan clay; at Hamilton, Ont., from imported clays; and at St. John, N.B., partly from Nova Scotia clay.

Flower pots are made at a few localities from the red burning and tile clays of the vicinity.

Refractories.—The total value of the sales of fireclay, firebrick, fireclay brick, silica and magnesite brick in 1920 was \$474,113. There was in addition a production of fireclay products, valued at \$211,289, reported as being made from imported clays. The production in 1920 included: fireclay, or refractory clay sold as such, 8,321 tons, valued at \$44,091; firebrick, including silica brick and magnesite brick in addition to fireclay brick, 7,293 thousand, valued at \$375,230; and other fireclay products valued at \$54,792.

Sewerpipe.—The total sales of sewerpipe in 1920 were 58,887 tons, valued at \$1,549,090. About 55.6 per cent of the value of the production is credited to Ontario.

	1917		1918		1919		1920	
	Quant'y	Value	Quant'y	Value	Quant'	Value	Quant'	Value
Manufactured—		\$		\$		\$		\$
Common brick.... M	216,596		163,960		302,278		347,016	
Pressed brick..... M	51,472		38,171		81,146		102,868	
Stocks, Dec. 31—								
Common..... M	57,596		57,419		51,110		84,023	
Pressed..... M	17,273		11,665		18,458		28,668	
Production—								
Common..... M	210,631	1,999,465	164,970	1,879,811	291,470	3,850,219	303,343	4,835,996
Pressed..... M	46,409	653,153	40,147	639,083	74,424	1,304,162	85,137	2,004,537
Fire proofing..... Tons.		299,645	28,087	226,798	41,406	345,382	49,091	591,418
Hollow building blocks..... M		95,088	1,402	40,876	1,985	76,673		302,261
Kaolin..... Tons.	533	9,594	863	19,299	759	13,744	683	15,022
Ornamental..... M		32,854	358	28,296	365	10,175	3,515	73,926
Terra-cotta lumber M		21,380	175	15,146		40,527		46,743
Pottery.....		122,878		130,242		185,474		209,171
Refractories—								
Fireclay..... Tons.	10,534	49,455	8,732	44,351	4,600	24,163	8,321	44,091
Firebrick..... M	8,192	199,171	7,192	248,884	5,610	268,756	7,293	375,230
Other products..... Tons.		77,885		111,589	2,946	96,435		54,792
Sewerpipe..... Tons.		783,762	36,574	699,774	62,821	1,074,146	58,887	1,549,090
Tile, drain..... M		434,708	19,762	499,340	20,078	616,510	14,527	562,652
		4,779,038		4,583,489		7,906,366		10,664,929
Imports—								
Bath brick.....		2,299		2,134		1,135		1,793
Building brick.... M	4,111	61,511	3,232	55,976	7,394	128,876	2,944	94,314
Bldg. blocks.....		151,765		64,622		102,107		153,250
Clays—								
China..... Tons.	11,596	97,856	10,538	116,699	8,643	129,652	13,445	234,668
Fire.....		283,746		401,357	30,777	185,156	50,611	267,180
Pipe.....		2,427		2,167		922		2,804
Other clays.....		32,180		34,130		46,420		145,988
Drain tile, unglazed.....		2,289		481		481		5,744
Drain and sewerpipe.....		42,864		24,763		66,727		30,111
Earthen and chinaware.....		2,595,582		2,163,455		2,925,295		5,380,462
a Firebrick.....		1,994,212		2,852,233		906,481		1,388,390
Firebrick, n.o.p.....		691,578		650,341		434,505		579,365
Magnesite brick.....	b	470,801		210,103		120,189		446,445
Silica brick.....					b	157,374		378,759
Paving brick..... M	2,190	37,814	798	17,534	3,552	77,374	2,269	74,515
Other clay mfrs.....		143,913		138,086		144,008		230,995
		6,610,837		6,734,081		5,426,702		9,414,783
Exports—								
Bldg. brick..... M	4,464	40,039	3,277	34,593	4,770	52,050	8,073	115,627
Clay—								
Unmanufactured Cwt.		83,600		129,691	5,901	3,672	4,738	2,175
Manufactures.....						84,953		196,222
Earthenware.....		14,504		10,633		23,579		44,127
		138,143		174,917		164,254		358,151
Consumption.....		11,251,732		11,142,653		13,168,814		19,721,561

a Duty free; of a kind not made in Canada. b Last 9 months.

LIME

The production of lime in 1920 was reported as 9,427,334 bushels, valued at \$3,818,553, or an average of 40½ cents per bushel. Fifty-eight firms reported with 1,069 men employed, and wages paid \$1,314,186.

The average price per bushel of lime sold in 1920 varied from a minimum of 20 cents in Nova Scotia to a maximum of 61 cents in British Columbia. Over 86 per cent of the total production was derived from Ontario, Quebec, and the Maritime Provinces. The production of hydrated lime was 35,595 tons, valued at \$481,286.

The exports during 1920 were 23,016 tons, valued at \$381,899, while the imports were 2,739 tons, valued at \$48,790.

	1917		1918		1919		1920	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Bush.	\$	Bush.	\$	Bush.	\$	Bush.	\$
Production—								
Nova Scotia....	985,286	197,057	748,314	149,663	366,543	73,309	201,500	40,300
P. E. Island.....	820	287						
New Brunswick..	532,251	171,248	482,548	221,935	468,533	223,193	701,859	365,030
Quebec.....	1,470,486	335,012	1,527,784	418,888	1,796,822	493,762	2,108,203	826,044
Ontario.....	2,846,850	668,368	2,660,791	762,976	3,578,834	1,143,973	5,109,635	1,962,086
Manitoba.....	393,982	92,932	462,544	134,725	476,452	147,131	605,399	210,984
Alberta.....	104,540	35,516	80,408	44,141	109,067	41,276	139,433	72,477
Br. Columbia...	232,955	58,067	401,562	143,697	351,253	187,963	561,305	341,632
	6,567,170	1,558,487	6,363,951	1,876,025	7,147,504	2,310,607	9,427,334	3,818,553
Hydrated lime produced ¹	Tons 16,339	126,268	Tons 18,133	167,250	Tons 27,950	295,164	Tons 35,595	481,286
Imports.....	12,150	78,254	4,987	53,745	3,977	53,190	2,739	48,790
Exports.....		74,523	7,483	70,930	9,654	128,810	23,016	381,899

¹Included in total production of lime.

SAND-LIME BRICK

The first record of the production of sand-lime brick in Canada was obtained for the year 1907, when there was a production by ten firms amounting to 16,492,971 brick, valued at \$167,795.

In 1920 the sales were reported as 45,459,022 brick, valued at \$724,918, or an average of \$15.95 per thousand, as compared with sales in 1919 of 33,553,699 brick, valued at \$484,854.

	1917		1918		1919		1920	
	M.	Value	M.	Value	M.	Value	M.	Value
		\$		\$		\$		\$
Manufactured.....	17,080		15,256		36,111		48,926	
Sold or used.....	18,002	201,355	14,539	186,066	33,554	484,854	45,459	724,918
Stocks, Dec. 31....	3,259		2,610		2,244		6,086	

SAND AND GRAVEL

The total sales of sand and gravel produced in Canada during 1920 amounted to 11,530,795 tons, valued at \$4,291,067. This production included: building sand and gravel for concrete and road building, 1,375,812 tons, valued at \$935,107; gravel, including sand and gravel and crushed gravel, 2,103,418 tons, valued at \$1,354,912; railway ballast, 7,940,700 tons, valued at \$1,883,833; moulding sand, 44,353 tons, valued at \$59,271; and other sands, core sands, engine sands, etc., 66,512 tons, valued at \$57,944.

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production—								
Sand.....	1,505,907	614,272	1,019,770	412,357	1,100,827	602,138	1,375,812	935,107
Sand and gravel	2,214,369	904,584	1,477,851	750,010	1,039,104	606,486	2,103,418	1,354,912
Ballast.....	5,312,218	718,801	8,633,917	1,087,207	8,119,387	1,373,704	7,940,700	1,883,833
Moulding sand...	46,790	46,018	62,835	71,488	55,451	71,249	44,353	59,271
All other.....	103,133	42,574	67,909	45,956	49,712	26,883	66,512	57,944
	9,182,417	2,326,249	11,262,282	2,367,018	10,364,481	2,680,460	11,530,795	4,291,067
Imports.....	328,520	312,403	310,610	435,992	200,830	200,428	219,398	267,950
Exports.....	1,075,374	290,964	902,750	229,957	1,074,341	131,140	1,491,786	193,503

SLATE

There is a small annual production of slate in Canada, obtained from the New Rockland quarries, Melbourne township, Richmond county, Quebec, operated by the New Rockland Slate Co., Limited. During 1920 shipments were also made from a deposit at St. Joseph de Beauce, Beauce county.

The production in 1920 was 1,532 squares, valued at \$12,362; and 240 tons of crushed material, valued at \$1,838. The production in 1919 was 1,632 squares, valued at \$10,853.

Exports have not been recorded since 1909. The imports of slate during the past twelve years have ranged in value from \$90,000 to over \$200,000 per annum. During the year 1920 they were valued at \$259,173.

	1917		1918		1919		1920	
	Squares	Value	Squares	Value	Squares	Value	Squares	Value
Production.....	1,422	\$ 7,789	933	\$ 5,124	1,632	\$ 10,853	(a)	\$ 14,200
Imports—								
Roofing.....	3,909	20,785	8,296	47,975	4,036	27,623	7,114	73,651
School-writing.....		40,603		41,122		46,342		76,594
Pencils.....		8,717		10,361		10,059		19,161
All other.....		36,788		33,596		58,953		89,767
		106,893		133,054		142,977		259,173

(a) 1,532 squares valued at \$12,362 and 240 tons crushed slate valued at \$1,838.

STONE

Statistics of stone production given herewith include the sales of all classes of stone used for building, monumental, and ornamental purposes, stone for paving purposes, curbstone and flagstone, rubble, riprap and crushed stone, limestone for furnace flux, sugar factories, etc., but stone used for burning lime or manufacturing cement is not included.

The kinds of stone quarried have been classed as granite (including trap rock, syenite and other igneous rocks), limestone, sandstone, and marble.

The records are practically confined to quarry operations, and to the production of sawn or polished stone when these operations are carried on by quarry operators. In addition to this production of stone by regular operators, there is no doubt a large stone production by individuals, such as farmers, and others, for house or barn foundations, concrete work, etc., of which it would be impracticable to obtain any satisfactory record. Much stone is also used in railway construction work and in road building, of which the record is probably very incomplete.

The total value of the production of stone during 1920, according to returns received, was \$7,580,351, as compared with a value of \$4,225,937 in 1919, showing an increase of \$3,354,414.

The number of active firms reporting in 1920 was 168, the total number of men employed 3,487, and total wages paid \$3,302,253.

Production of Stone by Kinds and by Provinces, Showing Purposes for which Used, 1920

By kinds	Building	Ornamental and monumen- tal	Paving and curbstone	Rubble		Crushed		Furnace Flux		Total value	Percent of total
				Short tons	Value	Short tons	Value	Short tons	Value		
	\$	\$	\$		\$		\$		\$		%
Granite.....	393,511	402,870	229,644	842	1,041	336,577	463,850	.....	.....	1,508,916	19.9
Limestone.....	445,548	21,806	3,068	557,229	647,742	3,406,689	3,863,613	637,999	684,116	5,665,693	74.7
Marble.....	228,353	.....	.....	270	540	4,850	11,700	.....	.....	240,593	3.2
Sandstone.....	88,721	.....	6,677	11,363	19,034	20,872	50,717	.....	.....	165,149	2.2
By Provinces											
Nova Scotia.....	12,840	20,110	7,900	7,081	12,810	17,762	39,481	292,467	327,034	420,175	5.54
New Brunswick.....	27,550 ⁽¹⁾	138,623	70,114	.....	.....	9,486	27,158	6,081	16,732	280,167	3.69
Quebec.....	702,740	233,418	139,458	22,893	26,776	777,981	1,086,858	75	75	2,189,325	28.88
Ontario.....	63,073	40,571	21,917	528,257	610,001	2,801,105	3,026,167	267,913	273,749	4,035,478	53.24
Manitoba.....	275,661	6,804	.....	11,323	16,196	63,305	75,625	.....	.....	374,286	4.94
Alberta.....	1,476	.....	.....	1,308	1,533	.....	.....	937	1,406	4,415	0.06
British Columbia.....	72,793	2,950	.....	1,842	1,041	99,349	134,591	70,526	65,130	276,505	3.65
Total.....	1,156,133	442,476	239,389	571,704	668,357	3,768,988	4,389,880	637,999	684,116	7,580,351	.....
Per cent.....	15.3	5.8	3.2	.....	8.8	.....	57.9	.....	9.0	.....	100.0

⁽¹⁾ Finished stone valued at \$241,555.

**Production of Stone by Kinds and by Provinces, showing purposes for which used,
1920**

	1917		1918		1919		1920	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Production—								
Granite.....		639,412		590,871		850,563		1,508,916
Limestone.....		2,283,659		2,342,403		3,074,815		5,665,693
Marble.....		55,820		550		213,982		240,593
Sandstone.....		261,256		102,750		86,577		165,149
Production—								
Nova Scotia.....		569,521		478,721		413,194		420,175
New Brunswick.....		111,150		99,044		125,294		280,167
Quebec.....		991,593		952,402		1,441,919		2,189,325
Ontario.....		992,455		1,079,745		1,936,268		4,035,478
Manitoba.....		301,968		238,251		89,067		374,286
Alberta.....		7,482		569		3,189		4,415
British Columbia.....		265,978		187,842		217,006		276,505
		3,240,147		3,036,574		4,225,937		7,580,351
Exports.....								
Crushed.....	2,308	2,277	1,526	1,983	13,176	12,990	41,972	55,994
Ornamental, rough <i>a</i>	330	359	1,042	5,059	846	7,118	1,729	16,941
Building, rough <i>b</i>	139,153	122,430	62,683	107,690	16,859	23,899	9,612	16,246
Dressed.....		1,816		4,598		10,103		13,807
		126,882		119,330		54,115		102,988
Imports—								
Building stone.....		176,134		125,132		212,191		346,082
Granite.....		132,645		85,652		110,583		161,024
Marble.....		199,697		284,862		438,623		475,030
Refuse stone.....		256,182		236,516	416,220	199,528	461,813	235,078
		764,658		732,162		960,925		1,217,216

a Granite, marble, etc., unwrought.

b Freestone, limestone, etc., unwrought.

Gov. Doc.
Can
S

-D-28

CANADA
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT

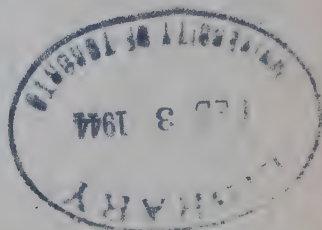
OF THE

MINERAL PRODUCTION OF CANADA

DURING THE CALENDAR YEAR

1921

Published by Authority of the Hon. J. A. Robb, M.P.,
Minister of Trade and Commerce



OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1923

CANADA
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT
OF THE
MINERAL PRODUCTION OF
CANADA

DURING THE CALENDAR YEAR

1921

Published by Authority of the Hon. J. A. Robb, M.P.,
Minister of Trade and Commerce



OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1923

LIST OF PUBLICATIONS

PREPARED IN THE

MINING, METALLURGICAL AND CHEMICAL BRANCH, DOMINION BUREAU OF STATISTICS

(1) MINERAL PRODUCTION (Mining and Metallurgy)

General Reports:—

- (a) Annual Report on the Mineral Production of Canada.
- (b) Preliminary Reports (semi-annual) on the Mineral Production of Canada.

Coal:—

- (a) Annual Report on Coal Statistics for Canada.
- (b) Monthly Report on Coal Statistics for Canada.

In addition to the foregoing reports on mineral production a series of annual bulletins is in preparation each of which will contain statistics relative to a particular metal or non-metallic mineral or to a special section of the mineral industry; the series when complete will cover every phase of mineral production in Canada.

(2) STATISTICS OF MANUFACTURES based on Mineral Products.

Summary reports on the sections of manufactures covered by the Mining, Metallurgical and Chemical Branch are issued as follows:—

Annual:

1. Iron and its Products—

Blast Furnaces and Steel Mills—Foundries and Machine Shops—Iron and Steel Fabrication—Boilers and Engines—Agricultural Implements—Machinery—Motors and Cycles—Car and Car Repairs—Heating and Ventilating Appliances—Wire and Wire Goods—Sheet Metal Goods—Hardware and Tools.

2. Manufactures of Non-Ferrous Metals—

Aluminium Ware—Brass and Copper Products—Lead, Tin and Zinc Products—Manufacture of the Precious Metals—Electrical Apparatus and Supplies—Miscellaneous Non-Ferrous Metal Goods.

3. Manufactures of Non-Metallic Minerals—

Abrasive Products—Asbestos Products—Coke and Its Products—Gas, Illuminating and Fuel—Glass and Its Products—Graphite Products—Petroleum and Its Products—Stone and Concrete Products—Miscellaneous Non-Metallic Mineral Products.

4. Chemicals and Allied Products—

Coal Tar and Its Products—Acids, Alkalies, Salts and Compressed Gases—Explosives, Ammunition, Fireworks and Matches—Fertilizers—Medicinal and Pharmaceutical Preparations—Paints, Pigments and Varnishes—Soaps, Washing Compounds and Toilet Preparations—Inks, Dyes and Colours—Wood Distillates and Extracts—Miscellaneous Chemical Industries.

Monthly:

1. Production of Iron and Steel in Canada.

In addition to the foregoing printed summary reports, a series of bulletins is being prepared, each number of which contains detailed statistics of a particular industry.

Copies of the available publications may be had upon request.

TABLE OF CONTENTS

	PAGE
List of Publications..	Inside front cover
Preface..	5

Part One—Commodity Statistics

Mineral Production of Canada..	6
General Statistical Review..	9

METALLICS—

Aluminium..	25
Antimony..	26
Cobalt..	28
Copper..	32
Gold..	38
Iron Ore..	49
Pig-Iron..	50
Steel..	51
Lead..	52
Mercury..	58
Molybdenum..	59
Nickel..	61
Platinum and Palladium..	66
Silver..	69
Tin..	76
Tungsten..	77
Zinc..	77

NON-METALLICS—

Abrasives..	83
Actinolite..	85
Arsenic..	85
Asbestos..	86
Barytes..	87
Chromite..	88
Coal..	88
Feldspar..	94
Fluorspar..	95
Graphite..	95
Gypsum..	97
Iron Oxides..	97
Magnesium Sulphate..	98
Magnesite..	98
Manganese..	99
Mica..	100
Mineral Water..	101
Natro-Alunite..	102
Natural Gas..	102
Peat..	103
Petroleum..	103
Phosphate..	106
Pyrites..	107
Quartz..	108

	PAGE
NON-METALLICS— <i>Concluded.</i>	
Salt..	109
Sodium Carbonate..	110
Sodium Sulphate..	110
Talc..	111

STRUCTURAL MATERIALS AND CLAY PRODUCTS—

Cement..	113
Clay and Clay Products..	113
Lime..	117
Sand and Gravel..	118
Sand-Lime Brick..	119
Slate..	120
Stone..	120

Part Two—General Statistics

General Review of the Mineral Industry..	125
--	-----

METALLIC MINERAL INDUSTRIES—

Alluvial Gold Mining..	133
Auriferous Quartz Mining and Milling..	135
Copper-Gold-Silver Mining..	143
Nickel-Copper Mining..	148
Silver-Cobalt Mining and Milling..	154
Silver-Lead-Zinc Mining and Milling..	159
Iron Ore Mining..	168
Metallurgy of the Non-Ferrous Metals..	170

NON-METALLIC MINERAL INDUSTRIES—

Asbestos Industry..	180
Coal Mining..	185
Feldspar Industry..	190
Gypsum Industry..	193
Mica Industry..	197
Natural Gas Industry..	199
Petroleum Industry..	204
Salt Industry..	207

MISCELLANEOUS NON-METALLIC MINERAL INDUSTRIES (Fluorspar, Grindstones, Iron Oxides, Magnesite, Quartz, Talc, etc.)..	212
--	-----

STRUCTURAL MATERIALS AND CLAY PRODUCTS INDUSTRIES—

Cement Industry..	217
Clay Products Industry..	221
Lime Burning Industry..	225
Sand and Gravel Industry..	229
Stone Quarrying..	231

PREFACE

The present Annual Report on the Mineral Production of Canada is designed to supplement the Preliminary Reports on this subject issued by the Dominion Bureau of Statistics as for the six months ending June 30, 1921, and for the twelve months ending December, and to present the final figures for the whole of the calendar year.

Annual statistical reports on the mineral production of Canada have been published for many years, first by the Geological Survey and later by the Mines Branch of the Department of Mines. The present report is issued in continuance of this series, and every effort has been made to ensure complete continuity of the record. Some changes, however, in the format have been made, and certain new material has been introduced which it is believed will be found of value to the mineral industry.

The statistics relating to the different minerals and the general statistical tables have been prepared as formerly, although the plan of issuing two reports, one on mineral production generally, and one on the production of metals, has been discontinued; the sections on metals in this report have been expanded so that the records are complete in one cover.

The general reviews of the principal mineral industries, (e.g., the copper-gold industry, the silver-lead-zinc industry, the nickel-copper industry, etc., etc.) and the section on metallurgical works are included for the first time. In recent years the value of statistics of this character, covering capital, labour, equipment, etc., has become more generally recognized and the demand for such information has greatly increased. It is thought that in these new sections a contribution has been made to the literature of the mineral industry which will prove distinctly valuable, as it will definitely illustrate the place which mining holds in the scheme of Canadian productive enterprise.

The cordial thanks of the Bureau are tendered to the Dominion Department of Mines and to the several Provincial Departments of Mines, which have without exception assisted materially in the preparation of the report. It may be added that the co-ordination of the general work on mining statistics between the Provincial Departments and the Bureau has made progress during the year. It has been found possible to arrange for the co-operative collection of monthly statistics of coal production with all the provinces in which such records are obtained, namely, Nova Scotia, New Brunswick, Saskatchewan, and Alberta. In the field of general mining statistics, conferences with the Ontario Department of Mines have resulted in a plan whereby the final data for the year 1921 were collected on joint forms, thus preventing overlapping and duplication of work. The data collected by the Bureau on mining statistics are made available to the Dominion Department of Mines.

The thanks of the Bureau are also tendered to the mine and smelter operators, for assistance given and information made available. The railway and other transportation companies, as well as smelter operators outside of Canada, have also furnished data the receipt of which is gratefully acknowledged.

The report has been prepared under the direction of Mr. S. J. Cook, chief of the Mining, Metallurgical and Chemical Branch of the Bureau, by Mr. A. C. Young, who also directly supervised the work on metals and metalliferous ores. Mr. B. R. Hayden compiled the data on non-metalliferous products.

R. H. COATS,
Dominion Statistician.

DOMINION BUREAU OF STATISTICS, OTTAWA.
November 30, 1922.

TABLE 1

Mineral Production of Canada, 1920 and 1921*

		1920			1921		
		Quantity	Value (a)	Per cent of total	Quantity	Value (a)	Per cent of total
METALLIC			\$			\$	
Cobalt, metallic and contained in oxide.....	Lb.	546,023	1,365,058	0.60	251,986	755,958	0.44
Copper (b).....	"	81,600,691	14,244,217	6.25	47,620,820	5,953,555	3.46
Gold.....	Fine oz.	765,007	15,814,098	6.94	926,329	19,148,092	11.14
Iron pig from Canadian ore.....	Tons	75,869	2,066,997	0.91	56,564	1,873,682	1.09
Iron ore sold for export.....	"	8,885	64,538	.....	1,058	3,272	.....
Lead (c).....	Lb.	35,953,717	3,214,262	1.41	66,679,592	3,828,742	2.23
Nickel (d).....	"	61,335,706	24,534,282	10.77	19,293,060	6,752,571	3.92
Palladium.....	Crude oz.	913	58,392	.....	591	38,267	.....
Platinum (e).....	"	595	37,680	.....	292	21,910	.....
Rhodium, Osmium, Iridium.....	"	513	31,815	.....	57	9,690	.....
Silver (f).....	Fine oz.	13,330,357	13,450,330	5.90	13,543,198	8,485,355	4.94
Zinc.....	Lb.	39,863,912	3,057,961	1.34	53,089,356	2,471,310	1.44
Total.....			77,939,630	34.20		49,343,232	28.70
NON-METALLIC							
Actinolite.....	Tons	100	1,160	.....	78	975	.....
Arsenic, white and in ore.....	"	2,459	447,848	0.20	1,491	233,703	0.14
Asbestos.....	"	199,573	14,792,201	6.49	92,761	4,906,230	2.85
Barytes.....	"	751	22,983	.....	270	9,567	.....
Chromite.....	"	11,016	251,379	0.11	2,798	55,696	.....
Coal.....	"	16,631,954	80,693,723	35.41	15,057,498	72,451,656	42.14
Corundum.....	"	196	24,547	.....	403	55,965	.....
Feldspar.....	"	37,873	280,895	0.12	29,868	230,754	0.13
Fluorspar.....	"	11,235	240,446	0.10	5,519	136,267	0.08
Graphite.....	"	2,190	165,617	0.07	937	65,862	.....
Grindstones.....	"	2,444	88,136	.....	1,281	64,067	.....
Gypsum.....	"	429,144	1,893,991	0.83	386,550	1,785,538	1.04
Magnesite.....	"	18,378	512,756	0.23	3,730	81,320	.....
Magnesium sulphate.....	"	1,947	39,886	.....	2,029	39,506	.....
Manganese.....	"	649	11,029	.....	68	3,400	.....
Mica.....	"	2,203	376,022	0.17	702	70,093	.....
Mineral water.....	Gal.		24,582	.....	328,273	21,716	.....
Natro-alunite.....	Tons			.....	30	1,500	.....
Natural gas (g).....	M. cu. ft.	16,845,518	4,232,642	1.86	14,077,601	4,594,164	2.67
Oxides, iron.....	Tons	19,128	157,909	0.07	9,048	93,610	.....
Peat.....	"	4,550	18,650	.....	1,666	6,664	.....
Petroleum, crude.....	Bbl.	196,251	822,235	0.36	187,540	641,533	0.37
Phosphate.....	Tons			.....	30	450	.....
Pyrites.....	"	174,744	719,110	0.32	32,173	116,326	0.07
Quartz.....	"	128,295	467,821	0.21	100,350	312,947	0.18
Salt.....	"	209,855	1,544,724	0.68	164,658	1,673,685	0.97
Sodium carbonate.....	"			.....	197	14,775	.....
Sodium sulphate.....	"	811	19,496	.....	623	18,850	.....
Strontium.....	"	75	2,625	.....			.....
Talc.....	"	21,671	166,934	0.07	10,124	144,565	0.08
Tripolite.....	"	260	8,600	.....	341	11,268	.....
Total.....			108,027,947	47.41		87,842,682	51.09
STRUCTURAL MATERIALS AND CLAY PRODUCTS							
Cement, portland and puzzolan.....	Bbl.	6,651,980	14,798,070	6.49	5,752,885	14,195,143	8.26
Clay products—							
Brick, common.....	No.	303,343,028	4,835,996	2.12	220,438,243	3,567,503	2.08
Brick, pressed.....	"	85,137,125	2,004,537	0.88	80,947,398	1,738,293	1.01
Brick, moulded and ornamental.....	"	3,515,000	73,926	.....	1,995,284	50,576	.....
Firebrick.....	"			.....	4,502,233	242,462	0.14
Fireclay.....	Tons		474,113	0.21	2,931	29,851	.....
Fireclay blocks and shapes.....	"			.....		91,685	.....
Fireproofing.....	Tons	49,091	591,418	0.26		452,296	0.26
Hollow building brick or blocks.....	No.		302,261	0.13	3,627,777	177,273	0.10
Kaolin.....	Tons	383	15,022	.....	124	1,888	.....
Pottery.....	"		209,171	0.09		231,262	0.13
Sewer-pipe.....	Tons	58,887	1,549,090	0.68		1,666,584	0.97
Terra-cotta.....	"		46,743	.....		134,193	0.08
Tile, drain.....	No.	14,527,000	562,652	0.25		473,952	0.28
Lime.....	Bush.	9,427,334	3,818,553	1.68	6,879,067	2,781,197	1.62
Sand and gravel.....	Tons	11,530,795	4,291,067	1.88	11,574,862	2,537,249	1.48
Slate.....	"		14,200	.....		22,323	.....
Stone—							
Granite.....	Tons		1,508,916	0.66	319,398	937,894	0.55
Limestone.....	"		5,665,693	2.49	3,322,024	5,155,046	3.00
Marble.....	"		240,593	0.11	1,650	172,720	0.10
Sandstone.....	"		165,149	0.07	28,426	78,036	.....
Total.....			*41,892,088	18.39		34,737,428	20.21
Grand total.....			*27,879,667	100.00		171,923,349	100.00

* includes "Sand-lime brick", \$724,918. † See notes on page 9.

Comparative Table of Mineral Production of Canada in 1920 and 1921

TABLE 2

		Increase (+) or Decrease (-)		Increase (+) or Decrease (-)	
		Quantity	%	Value	%
METALLIC					
Cobalt, metallic and contained in oxide.....	Lb.	- 294,037	53.85	- 609,100	44.62
Copper.....	"	- 33,979,871	41.64	- 8,290,662	58.20
Gold.....	Fine oz.	+ 161,322	21.09	+ 3,334,822	21.09
Iron pig from Canadian ore.....	Tons	- 19,305	25.45	- 193,315	9.35
Iron ore sold for export.....	"	- 7,827	88.09	- 61,266	94.93
Lead.....	Lb.	+ 30,725,875	85.46	+ 614,480	19.12
Nickel.....	"	- 42,042,646	68.55	- 17,781,711	72.48
Palladium.....	Crude oz.	- 322	35.27	- 20,125	34.47
Platinum.....	"	- 303	50.92	- 15,770	41.85
Rhodium.....	"	- 456	88.89	- 22,125	69.54
Silver.....	Fine oz.	+ 212,841	1.60	+ 4,964,975	25.91
Zinc.....	Lb.	+ 13,225,444	33.18	+ 586,651	19.18
Total.....				- 28,596,398	36.69
NON-METALLIC					
Actinolite.....	Tons	- 22	22.00	- 185	15.95
Arsenic, white and in ore.....	"	- 968	39.37	- 214,085	47.80
Asbestos.....	"	- 106,812	53.52	- 9,885,971	66.83
Barytes.....	"	- 481	64.05	- 13,416	58.37
Chromite.....	"	- 8,218	74.60	- 195,683	77.84
Coal.....	"	- 1,574,456	9.47	- 8,242,067	10.21
Corundum.....	"	+ 207	105.61	+ 31,418	127.99
Feldspar.....	"	- 8,005	21.14	- 50,141	17.85
Fluorspar.....	"	- 5,716	50.88	- 104,179	43.33
Graphite.....	"	- 1,253	57.21	- 99,755	60.23
Grindstones.....	"	- 1,163	47.59	- 24,069	27.31
Gypsum.....	"	- 42,594	9.93	- 108,453	5.73
Magnesite.....	"	- 14,648	79.70	- 431,436	84.14
Magnesium sulphate.....	"	+ 82	4.21	+ 380	0.95
Manganese.....	"	- 581	89.52	- 7,629	69.17
Mica.....	"	- 1,501	68.13	- 305,959	81.37
Mineral water.....	Gal.	-	-	- 2,866	11.66
Natra-alunite.....	Tons	+ 30	-	+ 1,500	-
Natural gas.....	M cu. ft.	- 2,767,917	16.43	- 361,522	8.54
Oxides, iron.....	Tons	- 10,080	52.70	- 64,299	40.72
Peat.....	"	- 2,884	63.38	- 11,986	64.26
Petroleum, crude.....	Bbl.	- 8,711	4.44	- 180,702	21.98
Phosphate.....	Tons	+ 30	-	+ 450	-
Pyrites.....	"	- 42,571	24.36	- 612,245	85.14
Quartz.....	"	- 27,945	21.78	- 154,874	33.11
Salt.....	"	- 45,197	21.54	- 128,961	8.35
Sodium carbonate.....	"	+ 197	-	+ 14,775	-
Sodium sulphate.....	"	- 188	23.18	- 646	3.31
Strontium.....	"	- 75	-	- 2,625	-
Talc.....	"	- 11,547	53.28	- 22,369	13.40
Tripolite.....	"	+ 81	31.15	+ 2,668	31.02
Total.....				- 20,194,726	18.69
STRUCTURAL MATERIALS AND CLAY PRODUCTS					
Cement, Portland and puzzolan.....	Bbl.	- 899,095	13.52	- 602,927	4.07
Clay products—					
Brick, common.....	No.	- 82,904,785	27.33	- 1,268,493	26.23
Brick, pressed.....	"	- 4,189,727	4.92	- 266,244	13.28
Brick, moulded and ornamental.....	"	- 1,519,716	43.23	- 23,350	31.59
Firebrick.....	}				
Fireclay.....				- 110,115	23.23
Fireclay blocks and shapes.....					
Fireproofing.....				- 139,122	23.52
Hollow building brick or blocks.....				- 124,988	41.35
Kaolin.....	Tons	- 559	81.84	- 13,134	87.43
Pottery.....				+ 22,091	10.56
Sewer pipe.....				+ 117,494	7.58
Terra-cotta and tile other than drain.....				+ 87,450	187.09
Tile, drain.....				- 88,700	15.76
Lime.....	Bush.	- 2,548,267	27.03	- 1,037,356	27.17
Sand and gravel.....	Tons	+ 44,067	0.38	+ 1,753,818	40.87
Slate.....				+ 8,125	57.22
Stone—					
Granite.....				- 571,022	37.84
Limestone.....				- 510,647	9.01
Marble.....				- 67,873	28.21
Sandstone.....				- 87,113	52.75
Total.....				- 7,154,660	17.08
Grand Total.....				- 55,936,323	24.55

Includes "Sand-lime brick," \$724,918, in total for 1920.

REPORT

OF THE

MINERAL PRODUCTION OF CANADA

DURING THE CALENDAR YEAR, 1921

BY S. J. COOK, B.A., A.I.C. Chief of the Mining, Metallurgical and Chemical Branch

General Review.—The break in prices of most metals during the last quarter of 1920 foreshadowed a difficult year in the mining industry in Canada. In spite of these difficulties and although many hitherto thriving branches of the mining industry suffered severely during 1921, there were redeeming features, and the completed survey of the mineral production showed that the aggregate value of the economic minerals produced during the calendar year reached a total of \$171,923,342, as compared with \$227,859,665 in the preceding year, and comprised metallics valued at \$49,343,232; non-metallics, \$87,842,682; and structural materials and clay products, \$34,737,428. For statistical and comparative purposes it has always been customary to determine the value of the metals, copper, gold, lead, nickel, silver and zinc as far as possible on the basis of the quantities of metals recovered from Canadian ores smelted during the year, either in Canada or abroad and to compute the value of this production in each case at the average price of the refined metal in a recognized market. The value of the non-metallics, and of the structural materials was determined as the value received by the producer at point of shipment. In this report, no departure has been made from the practice previously followed. The New York market was used in the case of the principal metals since most sales of Canadian products are made on that market.

The readjustment which had set in during the closing months of 1920 continued throughout the greater part of 1921 and particularly during the first half of the year there was little constructive change in the market conditions governing the sales of most mineral products. The mining of coal and the production of gold and silver were industries which might be excepted from the foregoing statement.

Towards the close of the year mineral markets became somewhat more active, prices showed a slight tendency to rise and with the gradual absorption of stocks left over from the abnormal activities of the war period a general improvement was observed.

The principal mineral producing province of Canada in 1921 was Ontario, the value of its mineral production being determined as \$57,356,651. British Columbia came second, with a mineral production valued at \$33,230,460; Alberta was a close third, with \$30,562,229; Nova Scotia ranked fourth, with \$28,912,111; Quebec was fifth, with \$15,157,094; and Manitoba, New Brunswick, Yukon Territory and Saskatchewan followed in the order named with productions between one and two million dollars each.

Notes on Tables 1 and 2.—(a) Copper, lead, nickel, silver and zinc are valued at the average price for the year of the refined metal. Pig-iron is valued at the furnace or spot, and non-metallics at point of shipment. (b) Copper content of smelter products and estimated recoveries from ores exported at 17.456 cents in 1920 and 12.502 cents in 1921. (c) Pig lead produced in Canada and estimated recoveries from ores exported at 8.940 cents in 1920 and 5.742 cents in 1921 (Montreal prices). (d) Nickel content of matte produced and nickel recovered from silver-cobalt-nickel ores at 40 cents in 1920 and 35 cents in 1921. (e) Production from alluvial sands, Port Colborne and New Jersey refineries in 1920 and from alluvial sands, Port Colborne and Deschenes refineries in 1921. (f) Silver bullion marketed by producers and estimated recoveries from ores and smelter products exported at 100.90 cents in 1920 and 62.654 cents in 1921. (g) Gross returns from sales of gas (producers statements).

Seventeen products contributed 98 per cent of the total recorded value of the mineral production of Canada in 1921, and in order of the values assigned these were: coal, gold, portland cement, clay products, silver, nickel, stone, copper, asbestos, natural gas, lead, lime, sand and gravel, zinc, iron, gypsum and salt. Production values of these commodities ranged from \$72,451,656 for coal down to \$1,673,685 for salt.

The output of coal while less than in the preceding year was still considerable, and the decline of 12 per cent from the quantity mined in 1920 was not sufficient to reduce the output to the level of 1919. Alberta and Nova Scotia were the principal producing provinces, Alberta being only slightly in advance of its eastern rival. Production continued in British Columbia at more nearly the same rate as in the preceding year than was the case in any of the other provinces. New Brunswick was the only province to exceed its 1920 output although Saskatchewan came within one per cent of the quantity mined in the preceding year. The mine operators in the several provinces have been fully alive to the necessity of seeking markets for their coal and in all the coal-producing provinces some attempt has been made to promote the coal trade. This statement is probably more particularly true of activities in Alberta where considerable work has been done with a view to establishing conditions under which Alberta coal might be moved east on a paying basis. An attempt was also made to obtain a share of the Pacific coast trade.

In value of production, gold ranked second during 1921 among the mineral products. Ontario was again the principal producer, and although the production of the mines was curtailed during the early months of the year owing to a shortage of hydro-electric power consequent upon a deficient water supply, the output at the standard rate of \$20.671834 per ounce reached a value of \$14,640,062. The most attractive feature of gold production was the fact that all gold sold to the Royal Mint at Ottawa was paid for in New York funds and the premium obtained added to the item "other income" very appreciably during the year. There was greater production of gold in British Columbia than in the preceding year, but in the Yukon the recorded output of placer gold was less than in 1920.

Fourteen (14) plants for the manufacture of cement were operated in Canada in 1921 and nine other plants equipped for the production of cement remained idle throughout the year. The output of cement was only slightly less than in the preceding year and amounted in all to 6,449,656 barrels, valued at over \$16,000,000. Sales, however, declined almost one million barrels from the record of 1920.

The manufacture of clay products in Canada including brick, firebrick, fireclay, fire-proofing, hollow building blocks, sewer pipe, pottery, terra-cotta and drain tile, involved a capital investment in 1921 estimated in excess of \$28,000,000 and accounted for products valued at nearly \$9,000,000. There was an appreciable decline in the production of every commodity in the list both in quantity and in value of sales, but in spite of this fact so widespread was this industry in Canada that over 200 plants were operated during the year.

Silver ranked fifth among the mineral products of Canada during 1921, with a production about 1.6 per cent above the quantity recovered in 1920. The output was very creditable and was valued at \$8,485,355. The average price of silver throughout the year was less than two-thirds of that prevailing in 1920. For the first half of the year it averaged 59.81 cents and was fairly steady at this level. Later the price advanced slightly and production rose accordingly, especially in Ontario where the factor of declining costs had a greater effect than in the provinces where silver was produced principally as a by-product in the recovery of other metals. The four leading companies, the Nipissing, the Mining Corporation, the O'Brien and Coniagas were all active

at the close of the year and other properties were increasing their operations. In British Columbia more than 3,350,000 ounces was produced, over 48 per cent of which was contained in lead and copper bullion from the Trail and Anyox smelters. The greater portion of the remainder was recovered from exported ores.

Throughout the year the marketing of nickel was so difficult that operations at the mines were curtailed to approximately one-half the normal rate. From time to time the working forces were cut down. Early in the year the British America Nickel Corporation discontinued operations and later the International Nickel Company also found it necessary to close down. The Mond Nickel Company which operated throughout the year, did so far below capacity. The surplus stocks of nickel continued to be a deterrent factor to production and even at the close of the year it was difficult to foresee how much longer the industrial depression would be reflected in a low output of nickel.

The production of stone in Canada in 1921 amounted in value to \$6,343,696, a decline of more than \$1,125,000 from the value of the output in 1920. Ontario was the leading producer and accounted for approximately two-thirds of the total production. The comparatively small amount of construction carried out in 1921 was definitely reflected in the lessened production of stone for building purposes.

The copper industry passed through a very trying period particularly during the first half of the year. Outstanding features were the closing down of the principal producing mines in the United States due to the falling-off in demand and the decline in sales to the lowest level since 1914. There was little change throughout the year in quotations. At the beginning of the year copper sold at 12.5 cents per pound on the New York market; in August the metal was quoted at 11.75 cents per pound with but few buyers. Towards the end of the year a remarkable recovery featured the copper market and by mid-December quotations rose to 13.75 cents per pound with some sales at 14 cents so that the year closed selling at its highest point. In spite of the exceptionally unfavourable conditions surrounding the copper industry, production of copper in Canada amounted to nearly 58 per cent of the production during the preceding year.

The mining and marketing of asbestos in 1921 declined to less than half the activity of the preceding year. Practically the whole of the Canadian production of asbestos is exported to the United States and thence to Europe. Owing to the adverse exchange situation between the countries of Europe and the United States, trading in asbestos was almost at a standstill throughout the year and although several mines were operated continuously, conditions generally were very dull.

The next product of value in 1921 was natural gas, in the production of which three provinces participated, with Ontario in the lead and Alberta next, with a production in excess of one-half the quantity produced in Ontario but with a value of only 45 per cent of that of the natural gas sold in Ontario. New Brunswick also contributed. The decline in the production of natural gas in Ontario has been a matter of some concern, and steps have been taken by the Ontario Government to conserve the supply and to utilize it to the advantage of all concerned. A Natural Gas Commissioner has been appointed and charged with the duties of administering the supply by a special act of the Legislature put in effect last year to safeguard the interests of the people in this important field.

Notwithstanding the general decline in prices during the past two years the quantity of lead recovered increased more than 85 per cent above the quantity produced in 1920 and was valued at almost 20 per cent more than the output of that year. Practically the whole of the production was from the smelters

at Trail which were operated continuously. Some lead was also produced from Ontario and Quebec ores.

The burning of lime in Canada is an old-established industry which in common with the other producers of construction materials was seriously affected by the depression in the building trades during the year. The output of lime while constituting 1.62 per cent of the total value of the mineral production of Canada in 1921, fell below the quantity made in the preceding year by almost one-third. The total value of the lime made in 1921 was \$2,781,197.

More than \$2,500,000 worth of sand and gravel was marketed in 1921 and in view of the existing conditions this output may be considered quite satisfactory in spite of the fact that the production in the preceding year was valued at more than \$4,000,000. Owing to the widely distributed deposits of sand and gravel in Canada a great many pits were operated and the products included sands for building purposes, for foundry use, for the manufacture of glass, and also very largely for the ballasting of railroad beds and repairs to existing lines.

Zinc increased one-third in quantity but fell off 17 per cent in value as compared with the production in the preceding year. As in other years, the production was derived entirely from British Columbia. Quebec, which formerly produced about a million pounds per year, did not report the shipment of a single consignment of zinc ore or concentrates, although ores containing lead were exported.

During 1921 the production of pig-iron from Canadian ores declined about one-third from the record of the preceding year, and the final totals showed that 56,564 tons of pig-iron was made. The Canadian furnaces depend very largely on imported ores, the furnaces in Ontario drawing from the famous Mesabi range while the Nova Scotia plants import their ore from Wabana, Newfoundland.

The production of gypsum in recent years has added to the mineral production of Canada and in 1921 the output was valued at \$1,785,538. Nova Scotia was the principal producer, although Ontario, Manitoba, and New Brunswick contributed appreciably towards the output. Some of the gypsum mined was sold in the crude form but a large part was calcined for further use.

The salt wells of the Essex peninsula in Ontario marketed commodities valued at \$1,673,685, an increase of more than \$100,000 in value over the preceding year in spite of the fact that the actual tonnage was considerably less. The production of the salt industry as a whole accounted for 0.97 per cent of the value of the mineral production of Canada, as compared with 0.68 per cent of the total value in the preceding year.

Metal prices.—Although the principal sales of metals mined in Canada are based on New York market prices, the difference in exchange between United States and Canada since 1919 has permitted Canadian mine operators to offset in certain measure the decline in prices which has characterized the metal markets during this period.

For the convenience of those who may desire to convert the values given in the tables to their equivalents in Canadian dollars for the years in which exchange premiums were a factor of importance, a table has been prepared which shows the amount paid in Canadian dollars for one American dollar during each month of the years 1920 and 1921. The figures given were obtained as the average of the maximum and minimum quotations for the month. In the table on metal prices the average prices of the principal metals for the past six years have been tabulated. The prices given for antimony, copper and silver on the New York market, spelter on the St. Louis market, lead on the Montreal market, nickel and cobalt at the average Canadian quotations for 1921, are the prices which have been used in this report in computing the value of the production of these metals from Canadian ores in 1921. Gold was as usual valued at \$20.671834 per fine ounce.

Mineral Statistics.—There is some variation in the methods used by the several Provincial Governments in computing the value of the metallic mineral output. In the province of British Columbia the accepted method is “to determine as the value of the metal production of the province the amount of ore for which the smelter or mill returns have been received during the year.” In Ontario, the general plan is the same except that the Provincial Government officers do not complete the compilation of the final reports for the year until full returns have been received by the mine operators from the smelters to which shipments were made. The practice in Quebec and the other provinces are similar to that followed in Ontario.

There seems to be reasonably complete agreement between the representatives of each of the provinces and of the Dominion in regard to reports on the production of non-metallic minerals and structural materials.

The apparent discrepancies between the mineral production reports issued from the Dominion Government and from the several Provincial Governments may be accounted for by the statement that different points of view have been held as to methods of procedure with the result that the questionnaires from the several offices have called for different information and even when the same data have been asked for, varying methods of compilation have been used in order to present to the reader the particular points of view held by the different offices.

The value of the mineral production of a province may be computed as the receipts by the mine and smelter operators from the mining and smelting industry in that province or it may be determined as the part of the world's mineral production contributed by the mines of the province. For many ores, return is made by a smelter for possibly one or two of the principal metals contained, and the mine operator is paid on this basis. Valuable by-products obtained by the smelter may be sold by it either as the finished product of commerce, or in the form of concentrates or residues. Again, as in the case of nickel, it may be that the Canadian smelter disposes of its product in the form of matte which has subsequently to be refined elsewhere.

The whole problem of the co-ordination of mineral statistics has been under study in the Bureau for some time and several improvements in procedure have already been introduced.

In the present report there have been included in the sections relating to the mineral production of Canada by provinces, tables abstracted from the reports prepared by the provincial offices.

EXCHANGE TABLE

Showing the amount paid in Canadian dollars for one United States dollar
by months, 1920 and 1921

TABLE 3

Month	1920	1921
	\$	\$
January.....	1.1056	1.1437
February.....	1.1497	1.1362
March.....	1.1178	1.1337
April.....	1.1112	1.1216
May.....	1.1134	1.1164
June.....	1.1381	1.1294
July.....	1.1134	1.1328
August.....	1.1275	1.1168
September.....	1.1075	1.1106
October.....	1.1016	1.0931
November.....	1.1231	1.0904
December.....	1.1643	1.0687
Average for the year.....	1.1227	1.1161

Metal Prices

(In cents per pound or ounce)

TABLE 4

	1916	1917	1918	1919	1920	1921
Antimony (ordinaries).... Per pound	25.370	20.690	12.581	8.190	8.490	4.957
Cobalt, Canadian price....						300.00
Copper, New York.....	27.202	27.180	24.628	18.691	17.456	12.502
Lead, ".....	6.858	8.787	7.413	5.759	7.957	4.545
London.....	6.715	6.626	6.270	6.211	8.219	4.942
Montreal.....	8.513	11.137	9.250	6.966	8.940	5.742
Nickel, New York.....	45.000	50.000	46.250	45.000	45.000	35.0*
Silver, "..... Per ounce	65.061	81.417	96.772	111.122	100.900	62.654
Spelter, "..... Per pound	12.804	8.901	8.159	7.338		
Spelter, St. Louis.....	12.634	8.730	7.890	6.988	7.671	4.655
Tin, New York.....	43.480	61.802	(a) 88.750	63.328	48.273	28.576

* Canadian price.

Annual Mineral Production in Canada since 1886

TABLE 5

Year	Value of production	Value per capita	Year	Value of production	Value per capita
	\$	\$		\$	\$
1886.....	10,221,255	2.23	1904.....	60,082,771	10.27
1887.....	10,321,331	2.23	1905.....	69,078,999	11.49
1888.....	12,518,894	2.67	1906.....	79,286,697	12.81
1889.....	14,013,113	2.96	1907.....	86,865,202	13.75
1890.....	16,763,353	3.50	1908.....	85,557,101	13.16
1891.....	18,976,616	3.92	1909.....	91,831,441	13.70
1892.....	16,623,415	3.39	1910.....	106,823,623	14.93
1893.....	20,035,082	4.04	1911.....	103,220,994	14.32
1894.....	19,931,158	3.98	1912.....	135,048,296	18.33
1895.....	20,505,917	4.05	1913.....	145,634,812	19.35
1896.....	22,474,256	4.38	1914.....	128,863,075	16.75
1897.....	28,485,023	5.49	1915.....	137,109,171	17.44
1898.....	38,412,431	7.32	1916.....	177,201,534	22.05
1899.....	49,234,005	9.27	1917.....	189,646,821	23.18
1900.....	64,420,877	12.04	1918.....	211,301,897	25.37
1901.....	65,797,911	12.16	1919.....	176,686,390	20.84
1902.....	63,231,836	11.36	1920.....	227,859,665	26.40
1903.....	61,740,513	10.83	1921.....	171,923,342	19.56

Annual Values of Metallic and Non-Metallic Production since 1907

TABLE 6

Year	Metallic	Non-Metallic		Total
		Fuels and other non- metallics	Structural materials and clay products	
	\$	\$	\$	\$
1907.....	42,426,607	31,275,546	12,863,049	(a) 86,865,202
1908.....	41,774,362	32,142,784	11,339,955	(a) 85,557,101
1909.....	44,156,841	31,141,251	16,533,349	91,831,441
1910.....	49,438,873	37,757,158	19,627,592	106,823,623
1911.....	46,105,423	34,405,960	22,709,611	103,220,994
1912.....	61,172,753	45,080,674	28,794,869	135,048,296
1913.....	66,361,351	48,463,709	30,809,752	145,634,812
1914.....	59,386,619	43,467,229	26,009,227	128,863,075
1915.....	75,814,841	43,373,571	17,920,759	137,109,171
1916.....	106,319,365	53,414,983	17,467,186	177,201,534
1917.....	106,455,147	63,354,363	19,837,311	189,646,821
1918.....	114,549,152	77,621,946	19,130,799	211,301,897
1919.....	73,262,793	76,002,087	27,421,510	176,686,390
1920.....	77,939,630	108,027,947	41,892,088	227,859,665
1921.....	49,343,232	87,842,682	34,737,428	171,923,342

(a) Total includes \$300,000 allowed for products not reported.

Mineral Production of Canada by Provinces, 1899-1921

TABLE 7

Calendar Year	Nova Scotia*	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Yukon	British Columbia
									\$
1899.....	\$6,817,274	\$ 420,227	\$2,585,635	\$9,819,557		\$17,108,707			12,482,605
1900.....	9,298,479	439,080	3,292,383	11,258,099		23,452,330			16,680,526
1901.....	7,770,159	487,985	3,759,984	13,970,010		19,297,940			20,531,833
1902.....	10,686,549	607,129	3,743,636	14,619,091		16,127,400			17,448,031
1903.....	11,431,914	580,495	3,585,938	14,160,033		14,082,086			17,899,147
1904.....	11,212,746	559,913	3,688,482	12,582,843		12,713,613			19,325,174
1905.....	11,507,047	559,035	4,405,975	18,833,292		11,387,642			22,386,008
1906.....	12,894,303	646,328	5,242,058	25,111,682		10,092,726			25,299,600
1907.....	14,532,040	664,467	6,205,553	30,381,638	\$898,775	\$ 533,251	\$ 4,657,524	\$3,335,898	25,656,056
1908.....	14,487,108	579,816	6,372,949	30,623,812	584,374	413,212	5,122,505	3,669,290	23,704,035
1909.....	12,504,810	657,035	7,086,265	37,374,577	1,193,377	456,246	6,047,447	4,032,678	22,479,066
1910.....	14,195,730	581,942	8,270,136	43,538,078	1,500,359	498,122	8,996,210	4,764,474	24,478,572
1911.....	15,409,397	612,830	9,304,717	42,796,162	1,791,772	636,706	6,662,673	4,707,432	21,299,305
1912.....	18,922,236	771,004	11,656,998	51,985,876	2,463,074	1,165,642	12,073,589	5,933,242	30,076,635
1913.....	19,376,183	1,102,613	13,475,534	59,167,749	2,214,496	881,142	15,054,046	6,276,737	28,086,312
1914.....	17,584,639	1,014,570	11,836,929	53,034,677	2,413,489	712,313	12,684,234	5,418,185	24,164,039
1915.....	18,088,342	903,467	11,619,275	61,071,287	1,318,387	451,933	9,909,347	5,057,708	28,689,425
1916.....	20,042,262	1,118,187	14,406,598	80,461,323	1,823,576	590,473	13,297,543	5,491,610	39,969,962
1917.....	21,104,542	1,435,024	17,490,077	89,066,600	2,628,264	860,651	16,527,535	4,482,202	36,141,926
1918.....	22,317,108	2,144,017	19,605,347	94,694,093	3,120,600	1,019,781	23,109,987	2,355,631	42,935,333
1919.....	23,445,215	1,770,945	21,267,947	67,917,998	2,868,378	1,521,964	21,087,582	1,940,934	34,865,427
1920.....	34,130,017	2,491,787	28,886,214	81,715,808	4,223,461	1,837,468	33,586,456	1,576,726	39,411,728
1921.....	28,912,111	1,901,505	15,157,094	57,356,651	1,934,117	1,114,220	30,562,229	1,754,955	33,230,460

*Includes a small production from Prince Edward Island.

Mineral Production of Canada by Provinces, 1919, 1920 and 1921

TABLE 8

Province	1919		1920		1921	
	Value of production	Per cent of total	Value of production	Per cent of total	Value of production	Per cent of total
	\$		\$		\$	
Nova Scotia.....	23,445,215	13.27	34,130,017	14.98	28,912,111	16.82
New Brunswick.....	1,770,945	1.00	2,491,787	1.09	1,901,505	1.10
Quebec.....	21,267,947	12.04	28,886,214	12.68	15,157,094	8.82
Ontario.....	67,917,998	38.44	81,715,808	35.86	57,356,651	33.36
Manitoba.....	2,868,378	1.62	4,223,461	1.85	1,934,117	1.12
Saskatchewan.....	1,521,964	0.86	1,837,468	0.81	1,114,220	0.65
Alberta.....	21,087,582	11.94	33,586,456	14.74	30,562,229	17.78
British Columbia.....	34,865,427	19.73	39,411,728	17.30	33,230,460	19.33
Yukon.....	1,940,934	1.10	1,576,726	0.69	1,754,955	1.02
Total for Canada....	176,686,390	100.00	227,859,665	100.00	171,923,342	100.00

Mineral Production of Nova Scotia, 1919, 1920 and 1921

TABLE 9

	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		
<i>Metallic—</i>						
Gold.....Fine oz.	850	17,571	690	14,263	*465	9,091
<i>Non-metallic—</i>						
Barytes.....Tons	468	8,154	751	22,983	270	9,567
Coal.....	5,720,373	22,078,726	6,429,291	32,238,129	5,734,928	27,782,050
Feldspar....."					16	117
Grindstones....."	283	9,000	211	8,440	183	6,990
Gypsum....."	163,852	250,174	260,661	573,752	206,831	511,883
Manganese....."	45	3,600	62	4,140	68	3,400
Salt....."	174	2,188	3,023	32,000	2,638	23,269
Tripolite....."	565	11,300	260	8,600	341	11,268
<i>Structural materials and clay products—</i>						
Lime.....Bush.	366,543	73,309	201,500	40,300	25,914	6,085
Stone.....Tons		413,194		420,175	58,923	116,602
Other products.....		145,099		226,121		† 431,789
Total.....		23,445,215		34,130,017		28,912,111

The total production of blast furnace pig-iron in Nova Scotia in 1919 was 285,087 tons valued at \$7,141,-641; in 1920 it was 332,493 tons valued at \$7,687,614 and in 1921, the production was 169,504 tons valued at \$3,633,516.

* Includes 25 oz. silver, value \$16.

† Includes railway ballast from P.E.I., \$1,433.

Mineral Production of Nova Scotia as reported by the Department of Public Works and Mines, Nova Scotia, year ending September 30, 1919-20-21

TABLE 10

Mineral	Unit of Measure	1919	1920	1921
Coal.....	long tons	5,004,757	5,678,970	5,373,230
Pig-iron.....	short tons	334,500	280,536	158,611
Steel ingots.....	"	374,888	361,742	203,662
Coke.....	"	518,713	382,608	233,799
Limestone and dolomite.....	"	353,379	249,993	78,932
Gypsum (crude).....	"	48,868	174,520	185,934
Gypsum (calcined).....	"	7,107	5,089	16,415
Building stone.....	"	7,450	8,040	4,507
Grindstone.....	"	300	211	186
Brick (common).....	number	12,894,550	18,350,354	11,993,790
Brick (firebrick).....	"		33,604	307,614
Drainpipe and tile.....	feet	605,872	1,164,270	826,254
Fireclay crude.....	short tons			2,351
Fireclay ground.....	"		947	1,570
Gold-bearing ore.....	"	1,362	850	1,650
Gold.....	ounces	935	744	379
Arsenic concentrates.....	short tons		500	
Manganese ore.....	"		100	450
Barytes.....	"	50	550	350
Salt.....	"		3,095	2,606
Ammonium sulphate.....	"	6,698	6,023	4,314
Benzol.....	Imp. gals.		236,583	389,499
Toluol.....	"	19,638	107,522	29,820
Solvent naphtha.....	"		37,466	12,708
Tar.....	"		4,610,243	3,618,400
Hollow building blocks.....	short tons			244
Moulding sand.....	"			396
Square flue linings.....	"			607
Segmental sewer blocks.....	"			803
Infusorial earth, manf.....	"			300
Motor fuel.....	Imp. gals.			292,452
Iron ore (imported).....	long tons	646,028	599,099	311,952
Ferro-manganese (imported).....	long tons	1,111	7,840	2,079

Mineral Production of New Brunswick, 1919, 1920 and 1921

TABLE 11

Product	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
<i>Non-metallic:—</i>						
Coal..... Tons	179,108	794,761	166,048	1,055,286	187,192	920,666
Grindstones..... "	1,737	51,516	2,233	79,696	1,098	57,077
Gypsum..... "	42,409	315,656	49,405	428,183	54,030	360,220
Natural gas..... M cu. ft.	682,890	120,510	682,502	130,506	708,743	139,375
Petroleum..... Bbl.	4,225	13,141	5,148	19,963	7,479	33,022
<i>Structural materials:—</i>						
Clay products.....		52,941		73,484		66,600
Lime..... Bush.	468,533	223,193	701,859	365,030	562,447	203,084
Stone.....		125,294		280,167		97,290
Other products.....		73,933		59,472		24,171
Total.....		1,770,945		2,491,787		1,901,505

Mineral Production* of Quebec, 1919, 1920 and 1921

TABLE 12

Product	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
<i>Metallic:—</i>						
Copper..... Lb.	2,691,695	503,105	880,638	153,724	352,308	44,045
Gold..... Ozs.	1,470	30,388	955	19,742	635	13,127
Iron ore, sold for export..... Tons	321	1,005	960	3,000		
Lead..... Lb.	2,280,000	158,825	905,472	80,949	595,881	34,215
Molybdenite..... "	83,002	69,203				
Silver..... Ozs.	140,926	156,600	61,003	61,552	38,084	23,861
Zinc..... Lb.	1,752,000	128,562	1,120,200	85,931		
<i>Non-metallic:—</i>						
Asbestos and asbestic..... Tons	159,236	10,975,369	199,573	14,792,201	92,761	4,906,230
Chromite..... "	8,541	228,898	11,016	251,379	2,798	55,696
Feldspar..... "	925	13,073	649	10,052	9,737	80,180
Graphite..... "	20	400	233	31,913	38	2,423
Magnesite..... "	11,273	328,465	18,378	512,756	2,927	74,109
Mica..... "		218,437		281,460		484
Mineral water..... Gal.		13,257	24,219	10,109	19,626	7,278
Iron oxides..... Tons	11,862	113,427	19,128	157,909	8,879	92,765
Peat..... "	486	4,811				
Phosphate..... "	22	300			30	450
Pyrites..... "	52,746	203,222	14,817	44,451	1,986	10,463
Quartz..... "	2,221	7,773	1,986	5,558	5,994	29,824
Talc..... "			150	1,050		
<i>Structural materials:—</i>						
Cement..... Bbl.	2,260,422	4,340,010	3,013,463	6,545,054	2,135,631	5,410,275
Clay products.....		1,563,832		2,361,007		1,742,872
Kaolin..... Tons	759	13,744	683	15,022	124	1,888
Lime..... Bush.	1,796,822	493,762	2,108,203	826,044	2,040,451	790,503
Slate..... Squares.	1,632	10,853	(a)	14,200	(b)	22,325
Stone.....		1,441,919		2,189,325	719,499	1,662,641
Other products.....		248,707		431,826	(c) 766,669	110,752
Total.....		21,267,947		28,886,214		15,157,094

*There is also in this Province an important production of aluminium from imported ores.

(a) 1,532 squares, and 240 tons of crushed material.

(b) 415 squares and 2,232 tons crushed material.

(c) Sand and gravel only in 1921.

Mineral Production of Quebec, 1919, 1920 and 1921, as reported by the Quebec Bureau of Mines

TABLE 13

Items	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
Asbestos..... Tons	135,861	10,932,289	179,891	14,749,048	84,475	5,199,789
Asbestic..... "	23,827	63,011	19,716	43,559	12,397	14,536
Chromite..... "	8,184	223,331	10,585	247,730	1,893	22,696
Copper and sulphur ore..... "	53,965	447,623	15,186	98,854	1,986	10,463
Feldspar..... "	1,684	25,409	849	11,252	9,797	79,752
Kaolin..... "			874	16,681	158	1,987
Gold..... Oz.	1,446	29,420	935	19,346	648	12,317
Graphite..... Lb.	20	400	466,420	31,913	84,684	2,422
Iron ore..... Tons			960	2,999		
Titaniferous iron ore..... "						
Magnesite..... "	9,940	283,719	17,941	512,755	4,984	74,110
Marl..... "						
Mica..... Lb.	3,853,265	224,988	1,496,399	281,729	288,197	42,222
Mineral water..... Gals.	30,519	12,608	20,811	9,962	14,621	5,339
Mineral paints (iron oxide, ochre)..... Tons	11,937	111,645	19,185	136,098	8,894	90,765
Molybdenite..... Lb.	83,002	69,203				
Peat..... Tons	486	4,811				
Phosphate..... "	20	300			30	453
Dolomite..... "					1,167	8,001
Quartz and silica..... "	15,055	50,161	24,865	60,147	6,496	29,906
Silver..... Oz.	127,223	141,373	57,514	58,032	39,327	21,339
Talc..... Tons			150	1,050		
Zinc and Lead ore..... "	5,318	103,138	3,015	56,927	15,500	18,080
<i>Building Materials</i>						
Brick..... M	94,312	1,179,624	129,440	1,956,473	78,665	1,198,471
Cement..... Bbl.	2,259,152	4,337,572	3,103,463	6,545,053	2,135,631	5,410,276
Granite..... "		334,692		494,372		369,122
Lime..... Bush.	2,124,898	521,031	60,301	682,477	54,920	624,574
Limestone..... Tons	708,172	916,776	988,209	1,584,316	1,007,733	1,523,027
Marble..... C. ft.	19,201	192,489	25,250	228,353	1,155	167,664
Sand, building..... Tons	486,877	180,987	397,508	206,432	596,673	263,813
Sandstone..... "	720	3,850	20,135	21,910	295	2,328
Slate..... Square	1,632	10,853		14,200	6,086	48,766
Tile, drain and sewer pipe, pottery etc.....		412,367		321,270		280,770
Total.....		20,813,670		28,392,939		15,522,988

Mineral Production of Ontario, 1919, 1920 and 1921

TABLE 14

Product	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
<i>Metallics</i>		\$		\$		\$
Cobalt, metallic and in oxide..... Lb.	530,371	1,325,928	546,023	1,365,058	251,986	755,958
Copper..... Lb.	24,346,623	4,550,627	32,059,993	5,596,392	12,821,385	1,602,930
Gold..... Ozs.	505,739	10,454,553	564,995	11,679,483	708,213	14,640,062
Iron ore, sold for export..... Tons	5,562	45,520	6,683	54,266	48	242
Iron, pig, from Can- adian ore (a)..... "	38,457	899,406	75,869	2,066,997	56,564	1,873,682
Lead..... Lb.	1,487,586	103,625	2,255,520	201,643	3,312,493	190,203
Nickel..... Lb.	44,544,883	17,817,953	61,335,706	24,534,282	19,293,060	6,752,571
Platinum..... Crude oz.	25	1,447	578	36,961	269	20,184
Palladium..... "	62	3,534	913	58,392	591	38,267
Rhodium, ruthium, osmium..... "			513	31,815	57	9,690
Silver..... Ozs.	12,117,878	13,465,628	9,907,626	9,996,795	9,761,607	6,116,037
Zinc..... Lb.	147,692	10,838	13,950	1,070		
<i>Non-Metallics</i>						
Actinolite..... Tons	80	880	100	1,160	78	975
Arsenious oxide..... "	2,859	488,706	1,831	425,617	1,491	233,763
Corundum..... "			196	24,547	403	55,965
Feldspar..... "	13,754	73,158	37,224	270,843	20,115	150,457
Fluorspar..... "	3,425	59,281	3,758	68,475	116	1,744
Graphite..... "	1,340	99,821	1,957	133,704	899	63,439
Gypsum..... "	58,899	278,120	74,707	404,162	84,790	433,053
Mica..... "	325	55,351	1,466	94,562	218	28,891
Mineral water..... Imp. Gal.		55,958		14,473	308,647	14,438
Natural gas..... M. cu. ft.	11,024,041	2,690,400	10,529,374	2,920,731	8,422,774	3,080,130
Peat..... Tons	500	1,750	4,550	18,650	1,666	6,664
Petroleum..... Bbl.	219,804	625,342	180,071	726,286	172,859	559,198
Phosphate..... Tons	2	31				
Pyrites..... "	117,011	285,832	148,652	618,283	27,785	101,306
Quartz..... "	60,055	179,549	90,433	321,063	72,068	220,806
Salt..... "	148,112	1,395,291	206,832	1,512,724	161,987	1,649,626
Strontium..... "	48	336	75	2,625		
Talc..... "	18,542	115,795	21,411	162,784	9,967	140,390
<i>Structural Materials and Clay Products</i>						
Cement..... Bbl.	2,023,280	3,650,585	2,035,594	4,377,814	2,723,071	6,424,356
Clay products..... "		4,574,796		5,613,488		5,183,125
Lime..... Bush.	3,578,834	1,143,973	5,109,635	1,962,086	3,530,547	1,344,188
Sand-lime brick..... No.	24,141,399	335,200	30,664,720	451,175		
Stone..... Tons		1,936,268		4,035,478	2,716,080	4,167,582
Other products..... "		1,192,516		1,931,924	6,273,173	1,496,729
Total.....		67,917,998		81,715,808		57,356,651

(a) The total production of blast-furnace pig-iron in Ontario in 1919 was 624,993 tons, valued at \$17,104,151; in 1920, 749,068 tons, valued at \$22,252,062 and in 1921, 494,901 tons valued at \$11,856,352.

(b) Sand and gravel only in 1921.

**Mineral Production of Ontario, 1919 and 1920, as reported by the
Ontario Department of Mines**

Products	1919		1920		*1921	
	Quantity	Value	Quantity	Value	Quantity	Value
<i>Metallic</i>		\$		\$		\$
Gold..... Ozs.	505,964	10,451,709	565,283	11,686,043	709,509	14,624,085
Silver..... "	11,363,252	12,904,312	11,065,415	10,873,496	8,412,059	5,497,160
Copper in matte..... Short tons	9,431	2,740,663	11,715	2,928,750	3,686	737,142
Nickel in matte (a)..... "	15,581	7,990,403	21,371	10,685,500	4,850	1,939,851
Iron ore, export- ed (b)..... "	5,953	48,341	68,616	60,958	100	459
Iron, pig (c)..... "	46,769	1,200,793	76,164	2,204,205	82,838	2,079,729
Lead, pig..... Lb.	1,529,987	94,507	2,232,253	179,714	3,570,222	190,843
Copper, blister..... "	5,684,183	969,024	6,825,772	1,041,994	3,070,719	356,708
Nickel, metallic..... "	10,202,308	3,592,984	11,015,692	3,852,141	5,430,147	1,825,359
Nickel oxide..... Ozs.	1,498,577	341,833	4,890,571	1,151,490	1,402,019	285,391
Platinum metals..... "	1,770	200,000	10,056	1,996,535	915	51,060
Cobalt, metallic..... Lb.	121,926	243,554	167,750	392,926	32,718	98,228
Cobalt, oxide..... "	426,573	624,553	569,182	1,210,810	155,554	354,418
Other cobalt com- pounds..... "	199,487	141,372	167,442	16,991	108,814	114,069
Nickel sulphate and carbonate..... "	353,267	46,711				
Total metallic.....		41,590,759		48,281,553		27,574,202
<i>Non-Metallic</i>						
Actinolite..... Tons	160	1,176	100	1,160	78	975
Arsenic, crude and white..... Lb.	5,668,170	485,360	3,781,389	432,434	2,982,525	233,763
Clay products—						
Brick, common..... M	141,255	1,966,711	123,551	2,209,265	99,463	1,743,094
Brick, fancy and pressed..... "	31,738	539,908	32,559	809,126	31,481	673,087
Tile, drain..... "	13,009	354,700	9,784	359,373	9,910	250,040
Tile, hollow build- ing..... Tons	17,435	184,900				
Tile, roofing..... "		1,692	58,737	369,530		211,529
Pottery..... "		119,551		127,049		67,985
Sewer pipe..... "		609,100		860,811		939,464
Cement, Portland.... Bbl.	2,022,575	3,659,720	2,035,594	4,377,814	2,723,072	6,425,266
Corundum..... Tons			196	27,000	402	50,250
Feldspar..... "	14,787	88,663	37,335	268,295	15,506	114,059
Fluorspar..... "	3,425	60,389	3,704	67,381	115	1,744
Graphite, crude and refined..... "	1,340	99,841	1,956	132,882	363	23,273
Gypsum, crushed, ground and calcined..... "	59,899	278,111	74,707	404,162	84,765	433,053
Iron pyrites..... "	117,178	366,422	148,651	618,283	19,375	91,604
Lime..... Bush.	3,911,572	1,268,290	4,982,912	1,799,763	2,610,143	1,172,680
Mica..... Tons	567	56,199	719	54,169	222	29,630
Mineral water..... Imp. gals.	276,833	19,290	127,150	15,059		9,000
Natural gas..... M. cu. ft.	11,085,819	2,583,324	10,545,000	3,163,500	8,590,000	2,953,000
Peat..... Tons	500	1,750	3,900	15,600	500	2,000
Petroleum, crude.... Bbl.	220,100	632,789	181,750	724,145	172,859	466,716
Phosphate (apatite)... Tons	2	31				
Quartz (silica)..... "	59,658	179,070	94,650	366,441	12,957	74,635
Salt..... "	148,112	1,395,368	206,612	1,544,867	149,599	1,509,287
Sand and gravel..... Cu. yds.	1,065,851	501,666	2,162,241	1,390,704	1,412,956	668,098
Sand-lime brick..... M	27,661	367,815	27,703	407,766		456,700
Stone, building, trap, gran- ite, etc..... "		1,230,922		3,944,972		1,812,863
Talc, crude and ground..... Tons	17,571	240,399	20,359	306,319	9,967	140,390
Total non-metallic.....		17,293,157		24,797,969		20,554,185
Add metallic.....		41,590,759		48,281,553		27,574,202
Grand total.....		58,883,916		73,079,522		48,128,387

(a) Copper and nickel in the matte valued at 14 and 25 cents per pound respectively in 1919 and 10 and 20 cents in 1920.

(b) Total shipments of iron ore, 195,919 tons valued at \$688,452, in 1919 and 126,710 tons valued at \$510,000 in 1920.

(c) Production from Ontario ore only. Total output of blast furnaces, 623,586 tons of pig iron, worth \$16,010,537, in 1919 and 748,173 tons worth \$21,652,308 in 1920.

*Preliminary figures subject to revision.

Mineral Production of Manitoba, 1919, 1920 and 1921

TABLE 16

Product	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
<i>Metallic</i>		\$		\$		\$
Copper..... Lb.	3,348,000	625,775	3,062,577	534,604		
Gold..... Ozs.	724	14,966	781	16,145	207	4,279
Silver..... "	20,760	23,069	15,510	15,649	33	20
<i>Non-Metallic</i>						
Gypsum, calcined.... Tons	32,903	371,337	44,371	487,894	40,859	480,282
Natural gas..... M. cu. ft.			200	60	200	60
<i>Structural Materials and Clay Products</i>						
Clay products.....		131,737		206,764		208,982
Lime..... Bush.	476,452	147,131	605,399	210,984	413,283	136,375
Sand-lime brick..... No.	7,389,300	124,847	10,278,802	197,734		
Stone..... Tons		89,067		374,286	16,868	56,666
Other products.....		1,340,449		2,179,341		1,047,453
Total.....		2,868,378		4,223,461		1,934,117

Mineral Production of Saskatchewan, 1919, 1920 and 1921

TABLE 17

Product	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
<i>Non-Metallic</i>		\$		\$		\$
Coal..... Tons	380,169	820,522	343,475	819,320	335,632	823,180
Magnesium sulphate.. "			2	103	2	120
Salt..... "					33	790
Sodium sulphate..... "	15	450	811	19,496	624	18,850
<i>Structural Materials and Clay Products</i>						
Clay products.....		270,989		471,448		166,244
Sand-lime brick (a) .. No.	1,294,000	14,601	2,258,500	35,383		
Other products.....		415,402		491,718		105,036
Total.....		1,521,964		1,837,468		1,114,220

(a) Sand-lime brick not included under Mineral Production in 1921.

Mineral Production of Alberta, 1919, 1920 and 1921

TABLE 18

	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
<i>Metallic</i>		\$		\$		\$
Gold, alluvial..... Ozs.	24	500			49	1,013
<i>Non-Metallic</i>						
Coal..... Tons	4,964,535	18,294,495	6,833,500	29,849,608	5,909,217	27,246,514
Natural gas..... M. cu. ft.	8,230,838	1,365,127	5,633,442	1,181,345	4,945,884	1,374,599
Petroleum..... Bbl.	16,437	97,841	11,032	75,986	7,203	49,313
<i>Structural Materials and Clay Products</i>						
Clay products.....		571,949		786,430		710,477
Lime..... Bush.	109,067	41,276	139,433	72,477	107,083	48,332
Sand-lime brick..... No.	729,000	10,206	2,257,000	40,626		
Stone.....		3,189		4,415	2,962	13,750
Other products.....		702,999		1,575,569		1,118,231
Total.....		21,087,582		33,586,456		30,562,229

Mineral Production of British Columbia, 1919, 1920 and 1921

TABLE 19

Product	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
<i>Metallic</i>		\$		\$		\$
Copper (a)..... Lb.	44,502,079	8,317,884	45,319,771	7,911,019	34,447,127	4,306,580
Gold..... Ozs.	167,252	3,457,406	124,808	2,580,010	150,792	3,117,147
Iron ore sold for export..... Tons			1,212	7,272	1,010	3,030
Lead..... Lb.	40,060,113	2,790,587	32,792,725	2,931,670	60,298,603	3,462,346
Platinum..... Ozs.	25	2,150	17	719	23	1,726
Silver..... "	3,713,537	4,126,556	3,327,028	3,356,971	3,350,357	2,099,133
Zinc..... Lb.	30,295,015	2,223,048	38,729,762	2,970,960	53,089,356	2,471,310
<i>Non-Metallic</i>						
Arsenic..... Tons	530	21,218	628	22,231		
Coal..... "	2,435,933	12,420,445	2,858,877	16,726,950	2,890,291	15,676,774
Fluorspar..... "	1,638	38,556	7,477	171,971	5,403	134,523
Gypsum..... "					40	100
Manganese..... "	616	10,559	587	6,889		
Magnesium sulphate.. "	738	9,115	1,945	39,783	2,027	39,386
Magnesite..... "					803	7,211
Mineral water.....		1,800				
Natro-alunite.....					30	1,500
Oxides (iron).....					169	845
Pyrites..... Tons	6,730	33,650	11,275	56,376	3,597	4,557
Quartz..... "	32,715	340,313	35,876	141,200	22,288	62,317
Sodium carbonate..... "					197	14,775
Talc..... "	100	500	110	3,100	167	4,175
<i>Structural Materials and Clay Products</i>						
Clay products.....		293,478		596,172		415,869
Lime..... Bush.	351,253	187,963	561,305	341,632	199,341	252,630
Stone..... Tons		217,006		276,505	142,041	229,165
Other products.....		373,193		1,270,298		925,301
Total.....		34,865,427		39,411,728		33,230,460

(a) Smelter recoveries of copper.

Quantities and Values of Mineral Products of British Columbia for 1919, 1920 and 1921, as reported by the B.C. Bureau of Mines

TABLE 20

	Customary Measure	1919		1920		1921	
		Quantity	Value	Quantity	Value	Quantity	Value
			\$		\$		\$
Gold placer.....	Ounces.....	14,325	288,500	11,080	221,600	11,660	233,200
" lode.....	"	152,426	3,150,645	120,048	2,481,392	135,663	2,804,154
Silver.....	"	3,403,119	3,592,673	3,377,849	3,235,980	2,673,389	1,591,201
Copper.....	Pounds.....	42,459,339	7,939,896	44,887,676	7,832,899	39,036,993	4,879,624
Lead.....	"	29,475,968	1,526,855	39,331,218	2,816,115	41,402,288	1,693,354
Zinc.....	"	56,737,651	3,540,429	47,208,298	3,077,979	49,419,372	1,952,065
Coal.....	Tons, 2,240 lb.	2,267,541	11,337,705	2,595,125	12,975,625	2,483,995	12,419,975
Coke.....	"	91,138	637,966	67,792	474,544	59,434	416,038
Miscellaneous products.....	"		1,283,644		2,426,950		2,077,030
Total.....			33,296,313		35,543,084		28,066,641

Mineral Production of Yukon, 1919, 1920 and 1921

TABLE 21

Product		1919		1920		1921	
		Quantity	Value	Quantity	Value	Quantity	Value
<i>Metallic</i>			\$		\$		\$
Copper.....	Lb.	165,184	30,874	277,712	48,478		
Gold.....	Ozs.	90,705	1,875,039	72,778	1,504,455	65,994	1,364,217
Silver.....	"	27,556	30,621	19,190	19,363	393,092	246,288
Lead.....	Lb.					2,472,615	141,978
<i>Non-Metallic</i>							
Coal.....	Tons	1,100	4,400	763	4,430	233	2,472
Total.....			1,940,934		1,576,762		1,754,955

METALLICS

ALUMINIUM

No commercial ores of aluminium have as yet been found in Canada. Aluminium is however, made extensively at Shawinigan Falls, Quebec, by the Northern Aluminum Company, from bauxite ores imported from the United States. A wire mill for the manufacture of aluminium wire and cables is also operated by the same firm. Bauxite is used in the manufacture of artificial abrasives as well as a source of aluminium.

There being but one firm engaged in the manufacture of aluminium in Canada, statistics of production may not be separately shown.

Imports of alumina, including bauxite, and exports of aluminium are, however, published in the reports of the External Trade Branch of the Dominion Bureau of Statistics. During the twelve months ending December 31, 1921, the imports of alumina were 15,024.5 tons, valued at \$638,483, as against 57,414.3 tons, valued at \$1,889,064, in 1920.

The imports of aluminium in ingots, bars, tubes, etc., in 1921, were 740,280 pounds, or 370 tons, valued at \$221,427, besides manufactures of aluminium valued at \$356,217, or a total value of \$1,550,277. In 1920, imports totalled 1,870,736 pounds or 935 tons of alumina, valued at \$633,733, and manufactures of aluminium valued at \$589,106; a gross value of \$1,222,839 for the year.

The exports of aluminium in ingots, bars, tubes, etc., in 1921 amounted to 5,399,800 pounds or 2,699.9 tons, valued at \$1,259,703, together with manufactures of aluminium valued at \$273,401; as against 19,716,300 pounds or 9,858 tons, valued at \$6,094,628, and manufactures valued at \$175,057 in 1920.

The manufacture of aluminium cooking utensils in Canada has been considerably developed during the past few years. There are now some eight firms engaged in the industry, which is described in a special report by this Bureau.

Imports of Alumina and Aluminium into Canada and Exports of Aluminium during 1919, 1920, 1921

TABLE 22

Item	1919		1920		1921	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
<i>Imports—</i>						
Alumina.....	58,603,100	1,565,264	114,828,600	1,889,064	30,049,100	638,483
Aluminium—						
Ingots, blooms, bars....	749,455	237,475	1,850,687	623,232	724,434	213,136
Tubing.....	19,518	10,090	20,049	10,501	15,846	8,291
Manufactures.....		252,065		394,488		258,885
Leaf foil.....		95,064		194,618		97,332
Total.....		2,150,958		3,111,903		1,216,127
<i>Exports—</i>						
Aluminium—						
Ingots, bars, etc.....	14,576,300	4,455,031	19,716,300	6,094,628	5,399,800	1,259,703
Manufactures.....		59,339		175,057		273,401
Total.....		4,514,370		6,269,685		1,533,104

Average Monthly Prices of Ingot Aluminium¹

(At New York in cents per pound)

TABLE 23

	1917	1918	1919	1920	1921
January.....	60.77	37.5	33.00	32.00	27.00
February.....	59.00	37.0	32.26	31.83	28.00
March.....	59.00	32.0	29.81	31.50	28.00
April.....	59.92	32.0	30.67	31.61	28.00
May.....	59.84	32.0	32.22	31.95	28.00
June.....	60.00	33.0	32.83	32.00	28.00
July.....	55.48	33.0	32.57	32.00	26.40
August.....	48.88	33.0	32.23	32.21	24.50
September.....	43.64	33.0	32.50	31.44	24.50
October.....	38.90	33.0	32.50	29.13	24.50
November.....	37.22	33.0	32.50	27.80	24.50
December.....	36.40	33.0	32.48	23.83	20.00
	51.59	33.46	32.14	30.61	25.95

¹From the "Engineering and Mining Journal," 1917 and 1918; and from the "Metals Statistics" for 1919 to 1921.

ANTIMONY

Until the year 1917 the production of small quantities of antimony, either as ore, or as a constituent in the residues from the lead refining at Trail was more or less consistent. Since that time no production has been reported. The producers of this metal are the Consolidated Mining and Smelting Company, Trail, B.C., and the Antimony Products Corporation, formerly the North American Smelting Corporation, Limited, Lake George, N.B. This latter company which was re-organized early in 1922, expected to commence operations during that year.

The imports of antimony and antimony salts in 1921 were 640,578 pounds, valued at \$40,127, as against 1,079,216 pounds, valued at \$97,288, in 1920. No exports of antimony ore or regulus have been reported for the past twenty years.

Production of Antimony in Canada, 1886-1921

TABLE 24

Calendar Year	Antimony ore		Refined regulus	
	Tons	Value	Pounds	Value
		\$		\$
1886.....	665	31,490		
1887.....	584	10,860		
1888.....	345	3,696		
1889.....	55	1,100		
1890.....	26½	625		
1891.....	10	60		
1892 to 1897.....				
1898.....	1,344	20,000		
1899 to 1904.....				
1905 (a).....	527			
1906 (a).....	782			
1907.....	2,016	65,000	63,850	5,108
1908 (b).....	148	5,443		
1909.....	35	1,575	61,207	4,285
1910.....	364	13,906		
1911-1914.....				
1915.....	1,341	81,283	59,440	11,888
1916.....	885	94,537	107,185	41,823
1917.....	361	22,000		
1918-1921.....				

(a) As recorded by the Nova Scotia Department of Mines; no value given.

(b) Exports.

Imports into Canada and Exports of Antimony, 1907-1921

TABLE 25

Calendar Year	Exports ^a of antimony ore		Imports					
			Antimony or regulus of		Antimony salts		Total imports	
	Tons	Value	Pounds	Value	Pounds	Value	Pounds	Value ^a
		\$		\$		\$		\$
1907.....	1,327	37,807	416,512	69,447	117,592	19,083	534,104	88,530
1908.....	148	5,443	396,904	28,509	29,832	2,452	426,736	30,961
1909.....	4	120	551,354	37,362	40,176	4,369	591,530	41,731
1910.....	239	14,095	388,952	25,296	94,330	9,152	483,282	34,448
1911.....	57	4,946	561,046	36,405	18,420	2,418	579,466	38,823
1912.....			998,045	60,456	55,683	7,197	1,053,728	67,653
1913.....			667,050	49,408	23,649	2,421	690,699	51,829
1914.....			648,516	47,498	45,634	10,217	694,150	57,715
1915.....	1,149	82,990	1,962,194	344,918	67,956	10,320	2,030,150	355,238
1916.....	794	48,158	796,728	208,450	41,985	13,891	838,713	222,341
1917.....	774	50,476	332,137	61,732	12,292	6,295	344,429	68,027
1918.....	26	1,430	648,882	92,678	34,921	18,986	683,803	111,664
1919.....	56	8,420	1,022,787	81,257	19,063	8,548	1,041,850	89,805
1920.....			1,059,249	86,803	20,067	10,485	1,079,316	97,288
1921.....			619,287	34,641	21,291	5,486	640,578	40,127

Prices—The average price of antimony over the months of 1921 was 4.957 cents per pound, as against 8.485 cents in 1920. The market for the metal was steady during the first quarter of the year with the price slightly over five cents per pound. For the remainder of the year the price declined gradually to 4½ cents with market conditions declining and weak.

Average Prices of Antimony*, 1917-1921

(In cents per pound at New York)

TABLE 26

	1917	1918	1919	1920	1921
	Ordinaries	Ordinaries	Ordinaries	Ordinaries	Ordinaries
January.....	17.29	14.281	7.43	10.58	5.26
February.....	29.80	13.823	7.17	11.59	5.25
March.....	32.89	13.091	6.80	11.06	5.28
April.....	34.04	12.536	6.79	10.50	5.14
May.....	25.20	12.846	7.66	9.66	5.25
June.....	19.51	13.055	8.44	8.29	5.09
July.....	15.83	13.197	8.99	7.50	4.74
August.....	15.06	14.000	8.96	7.18	4.60
September.....	14.94	14.145	8.63	7.11	4.56
October.....	14.75	13.319	8.71	6.72	5.09
November.....	13.91	8.771	9.11	6.11	4.73
December.....	15.06	7.915	9.63	5.53	4.50
	20.69	12.581	8.19	8.49	4.96

*As given by the "Engineering and Mining Journal". "Ordinaries" stand for: Hungarian, Chinese or other "Foreign" brands.

COBALT

The major portion of the world's supply of cobalt for almost two decades has been derived from the silver-cobalt-nickel arsenides of the Cobalt districts.

During 1921 three smelters in Ontario treated ores and residues from this district producing cobalt oxide, metallic cobalt, cobalt sulphate, cobalt carbonate, cobalt hydroxide, unseparated oxides and stellite (an alloy of cobalt used for high speed tool metal). The cobalt residues, which in past years were largely exported, were mainly treated in Canada during 1920 and 1921. In the latter year considerable shipments were made abroad. The total production in 1921 of cobalt contained in smelter products shipped, and cobalt residues exported, amounted to 251,986 pounds, which at \$3 per pound would be worth \$755,958, as against 546,023 pounds at \$2.50 per pound, valued at \$1,365,058 in 1920.

Summary of Cobalt Production Statistics, 1919, 1920 and 1921

TABLE 27

		1919	1920	1921
Cobalt ores and residues treated.....	Tons	9,084	8,988	5,141
Cobalt content of ores and residues treated.....	Lb.	1,070,826	1,200,040	131,673
Cobalt recovery from smelter products.....	Lb.	530,371	546,023	196,160
	Value	\$1,325,928	\$1,365,058	\$566,511
Metallic cobalt produced.....	Lb.	113,943	166,375	32,718
	Value	\$220,676	\$389,708	\$98,228
Cobalt oxide produced.....	Lb.	429,359	536,457	165,554
	Value	\$611,909	\$1,170,288	\$354,418
Other cobalt compounds.....	Value	\$34,308	\$600	
Mixed oxide (cobalt and nickel).....	Lb.			105,675
	Value			\$113,865

Production of Cobalt in Canada, 1912-1921

TABLE 28

Calendar year	Pounds	Value	Average price per pound	Calendar year	Pounds	Value	Average price per pound
		\$				\$	\$
1912.....	663,093			1917.....	1,079,572	1,727,315	1 60
1913.....	865,937			1918.....	737,157	1,842,893	2 50
1914.....	871,891			1919.....	530,371	1,325,928	2 50
1915.....	504,212			1920.....	546,023	1,365,058	2 50
1916.....	840,536	924,590	1.10	1921.....	251,986	755,958	3.00

Shipments of Metallic Cobalt and Cobalt Compounds, 1917-1921

TABLE 29

Calendar Year	Metallic Cobalt		Cobalt-oxide		Other cobalt compounds	Total Value
	Pounds	Value	Pounds	Value	Value	
		\$		\$	\$	\$
1917.....	393,773	616,633	802,447	1,104,500	740,032	2,461,165
1918.....	294,476	713,072	476,053	760,121	936,139	2,210,350
1919.....	113,943	220,676	429,359	611,909	34,308	866,893
1920.....	166,375	389,708	536,457	1,170,288	600	1,560,596
1921.....	32,718	98,228	165,554	354,418	113,865	566,511

The total amount of cobalt ores and residues treated in 1921 in the Ontario smelters and including that exported, amounted to 5,288 tons with a cobalt content of 187,499 pounds, or an average cobalt content of 1.8 per cent, as against 8,988 tons in 1920 containing 1,200,040 pounds of cobalt, or an average cobalt content of 6.7 per cent.

Ores and Residues of Cobalt treated, 1917-1921

TABLE 30

Year	Quantity (Tons)	Cobalt contents (Pounds)	Cobalt %
1917.....	7,770	866,327	5.6
1918.....	8,354	972,679	5.8
1919.....	9,084	1,070,826	5.9
1920.....	8,988	1,200,040	6.7
1921.....	5,288	187,499	1.8

Production of Cobalt in Ontario, 1904-1921

(As reported by the Ontario Bureau of Mines)

TABLE 31

Year	Tons	Value	Year	Tons	Value
		\$			\$
1904.....	16	19,960	1914.....	(a) 351	590,406
1905.....	118	100,000	1915.....	(b) 206	383,261
1906.....	321	80,704	1916.....	(b) 400	805,014
1907.....	739	104,426	1917.....	(b) 337	1,138,190
1908.....	1,224	111,118	1918.....	(b) 380	1,640,310
1909.....	1,533	94,965	1919.....	(b) 298	1,019,479
1910.....	1,098	54,699	1920.....	(b) 283	1,605,365
1911.....	852	170,890	1921*		
1912.....	934	314,381			
1913.....	821	420,386	Total.....	9,628	7,048,189

(a) Metallic content of cobalt oxide.

(b) Metallic content of all cobalt compounds.

* Information not available.

Operations of Ontario Silver-Cobalt Refineries, 1917-1921

(As reported by the Ontario Bureau of Mines)

TABLE 32

Year	Ores, etc., treated Tons	Products Shipped					
		Cobalt oxide		Cobalt salts		Cobalt metal	
		Pounds	Value	Pounds	Value	Pounds	Value
			\$		\$		\$
1917.....	7,964	418,703	533,489	52,485	13,211	396,395	589,290
1918.....	8,366	477,583	727,170	48,513	25,180	404,248	887,960
1919.....	8,260	426,573	634,553	66,193	46,615	121,926	243,554
1920.....	8,988	539,182	1,210,810	1,717	1,629	167,750	392,926
1921*							

* Information not available.

Imports of Cobalt into the United States, 1917-1921*

TABLE 33

Year	Cobalt, cobalt ore and zaffer		Cobalt oxide	
	Pounds	Value	Pounds	Value
		\$		\$
1917.....	223,794	369,950	276,406	275,821
1918.....	504,391	628,099	208,596	291,699
1919.....	77,556	144,282	131,424	184,751
1920.....	156,862	331,672	202,704	399,605
1921.....	46,099	108,774	164,003	342,426

*Preliminary Report on Mineral Resources of United States, 1919. Most of the cobalt used in the United States has been imported from Canada. All the cobalt and cobalt oxide imported in 1919 is thought to have come from Canada.

(a) Includes cobalt oxide.

Exports of Cobalt from Canada, 1917-1921

TABLE 34

Year	Metallic		Oxides and Salts		Alloys		General ore	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$		\$
1917.....	282,951	868,843	(a) 411,503	468,410	50,974	205,942	1,542,945	
1918.....	292,015	748,705	588,229	853,737	73,580	298,496	1,900,938	
1919.....	106,835	259,624	468,225	731,506	3,402	14,878	1,006,008	
1920.....	304,382	493,425			10,219	43,970	537,395	
1921.....	60,035	141,199	190,483	405,300	8,617	46,591	593,090	

(a) Covers the last 9 months in 1917—no exports recorded for the first quarter of 1917.

Imports of Cobalt into Canada, 1917-1921

TABLE 35

Year	Ore		Oxides of Cobalt, Tin and Copper, n.o.p.	
	Pounds	Value	Pounds	Value
		\$		\$
1917.....			153,682	77,368
1918.....			142,407	72,989
1919.....			112,104	44,414
1920.....	600	520	255,854	125,159
1921.....	100	131	119,092	40,730

Uses.—Prior to the war the principal demand for cobalt in the form of oxide was for colouring in the ceramic industry. A small demand for cobalt metal now exists for use in making high-speed tools, such as “stellite” an alloy of cobalt, chrome, and tungsten, or molybdenum. A small amount is used for plating and for making salts, such as cobalt sulphate and cobalt carbonate, and also for making cobalt hydroxide. Small amounts of cobalt are also used in the form of oleate and resinate of cobalt as a drying agent in the manufacture of paints and varnishes.

Prices.—The market for cobalt which was very poor in 1915, gradually improved during the war. No quotations on the New York markets were available during 1918, 1919 and 1920 and a nominal Canadian price of \$2.50 per pound has been used in this report. During 1921 the quotations given in the *Engineering and Mining Journal-Press* ranged from \$3 to \$3.50 per pound; the former value has been used.

Monthly Average Prices of Cobalt in London*

TABLE 36

(In shillings per pound)

Month	1918	1919	1920	1921
January.....	10/-	12/6-13/-	10/6	30/-
February.....	10/-	12/6-13/-	10/6	30/-
March.....	10/-	12/6-13/-	10/6	25/-
April.....	10/-	12/6-13/-	14/-	20/-
May.....	10/-	12/6-13/-	14/-	19/6
June.....	10/-	12/6-13/-	14/-	16/3
July.....	10/-	12/6-13/-	14/-	17/-
August.....	12/6	12/6-13/-	14/-	17/-
September.....	12/6	12/6-13/-	30/-nom.	16/7
October.....	12/6	12/6-13/-	30/-	15/6
November.....	12/6	10/6	30/-	15/6
December.....	12/6	10/6	30/-	15/-

*Published by The Metal Information Bureau, Limited, 7 East India Ave., London, E.C.

Bounties.—Under the provisions of the “Metal Refining Bounty Act,” passed by the Ontario Legislature in 1907, bounties were paid to refineries amounting to \$126,987.08 on cobalt metal, cobalt oxide, and salts of cobalt, and \$43,153.85 on nickel metal, nickel oxide, and salts of nickel, or a total for both cobalt and nickel of \$170,140.95. The quantities produced and the bounties paid each year are given in detail in the annual reports of the Ontario Bureau of Mines.

The bounty was at the rate of six cents per pound on the metallic contents of the oxides. The Act which expired in April, 1917, and was not re-enacted, was quoted in the Annual Report on Mineral Production of Canada for the calendar year 1914.

The results of researches on cobalt and cobalt alloys, undertaken for the Mines Branch by Dr. H. T. Kalmus, at Queen’s University, have been published in five parts.¹

¹ Mines Branch No. 259, “Preparation of Metallic Cobalt by Reduction of the Oxide.” Report on by H. T. Kalmus, B.Sc., Ph.D.

Mines Branch No. 334, “Electro-plating with Cobalt.” Report on by H. T. Kalmus, B.Sc., Ph.D., 1915.

Mines Branch No. 309, “The Physical Properties of the Metal Cobalt.” Report on by H. T. Kalmus, B.Sc., Ph.D.

Mines Branch No. 411, “Cobalt Alloys with Non-Corrosive Properties.” Report on by H. T. Kalmus, B.Sc., Ph.D.

Mines Branch No. 413, “Magnetic Properties of Cobalt and of Fe₂Co.” Report on by H. T. Kalmus, B.Sc., Ph.D.

A special report on the subject of cobalt has also been published by the Ontario Bureau of Mines.¹

COPPER

CANADA

The production of copper during 1921 amounted to 47,620,820 pounds, which at the average New York price for the year (12.502 cents per pound) was worth \$5,953,555, as against 81,600,691 pounds, valued at \$14,244,217, or an average price of 17.456 cents per pound in 1920. The decrease amounted to 41.64 per cent in quantity and 58.2 per cent in total value.

The 1921 production included: (a) 32,122,678 pounds contained in blister copper, a part of which was exported and a part was refined in Canada; (b) 12,645,391 pounds contained in nickel-copper matte, some of which was exported and some refined in Canada; (c) 162,111 pounds contained in copper sulphate; and (d) 2,690,640 pounds, the estimated recoveries from ores and concentrates exported for smelting and refining.

The corresponding figures for 1920 were (a) 31,481,884, (b) 32,000,079, (c) 44,766; and (d) 18,073,962 pounds.

Refined copper was produced commercially in quantity for the first time in Canada in 1916 at the Trail Refinery of the Consolidated Mining and Smelting Company. The copper rod mill completed early in the year was not operated throughout 1921. The British America Nickel Corporation produced refined copper at their Deschenes plant for the first time in 1920. The total production of refined copper in Canada during the past six years was as follows: 1916—483 tons; 1917—3,901 tons; 1918—3,809 tons; 1919—3,467 tons; 1920—2,590 tons and 1921—2,143 tons.

Summary of Copper Statistics for Canada, 1919, 1920 and 1921

TABLE 37

		1919	1920	1921
Ores and concentrates shipped (a).....	Tons.	1,085,950	987,506	1,042,135
	Value.	\$9,265,569	\$5,522,350	\$2,589,314
Copper production.....	Tons.	37,527	40,800	23,810
	Value.	\$14,028,265	\$14,244,217	\$5,953,555
Production by provinces:—				
Quebec.....	Lb.	2,691,695	880,638	352,308
Ontario.....	"	24,346,623	32,059,993	12,821,385
Manitoba.....	"	3,343,000	3,062,577	.....
British Columbia.....	"	44,502,079	45,319,771	34,447,127
Yukon.....	"	165,184	277,712	.....
Imports of copper (b).....	Tons.	15,395	24,561	5,833
	Value.	\$7,147,783	\$10,736,206	\$4,071,736
Exports of copper.....	Tons.	41,058	44,485	24,207
	Value.	\$14,654,640	\$15,877,306	\$7,455,794

(a) Does not include the nickel-copper ores, but only the copper-gold-silver ores with also small shipments of copper ore. See Nickel.

(b) Includes manufactures of copper for which no quantities are given; in 1919, \$455,023; in 1920, \$989,957, and in 1921, \$641,845; includes also copper ores in 1919, 1,685 tons valued at \$78,983; 1920, 1,220 tons valued at \$57,640, and in 1921, 1,375 tons valued at \$48,015.

¹ Report of Ontario Bureau of Mines, Vol. XXVII, Part III, Sec. 1. "Cobalt, its Occurrence, Metallurgy, Uses and Alloys," by Chas. W. Drury, 1919.

Production of Copper in Canada, 1886-1921

TABLE 38

Calendar year	Pounds	Value	Cents per pound	Calendar year	Pounds	Value	Cents per pound
		\$				\$	
1886.....	3,505,000	385,550	11.00	1904.....	41,383,722	5,306,635	12.823
1887.....	3,260,424	366,798	11.25	1905.....	48,092,753	7,497,660	15.590
1888.....	5,562,864	927,107	16.66	1906.....	55,609,888	10,720,474	19.278
1889.....	6,809,752	936,341	13.75	1907.....	56,979,205	11,398,120	20.004
1890.....	6,013,671	947,153	15.75	1908.....	63,702,873	8,413,876	13.208
1891.....	9,529,401	1,226,703	12.87	1909*	52,493,863	6,814,754	12.982
1892.....	7,087,275	818,580	11.55	1910.....	55,692,369	7,094,094	12.738
1893.....	8,109,856	871,809	10.75	1911.....	55,648,011	6,886,998	12.376
1894.....	7,708,789	736,960	9.56	1912.....	77,832,127	12,718,548	16.341
1895.....	7,771,639	836,228	10.76	1913.....	76,976,925	11,753,606	15.269
1896.....	9,393,012	1,021,960	10.88	1914.....	75,735,960	10,301,606	13.602
1897.....	13,300,802	1,501,660	11.29	1915.....	100,785,150	17,410,635	17.275
1898.....	17,747,136	2,134,980	12.03	1916.....	117,150,028	31,867,150	27.202
1899.....	15,078,475	2,655,319	17.61	1917.....	109,227,332	29,687,989	27.180
1900.....	18,937,138	3,065,922	16.19	1918.....	118,769,434	29,250,536	24.628
1901.....	37,827,019	6,096,581	16.117	1919.....	75,053,581	14,028,265	18.691
1902.....	28,804,259	4,511,383	11.626	1920.....	81,600,691	14,244,217	17.456
1903.....	42,684,454	5,649,487	13.235	1921.....	47,620,820	5,953,555	12.502

*The decrease is not as large as the figures would indicate because of the calculation of part of the 1909 production on a different basis from previous years.

The production by provinces was as follows: British Columbia, 72.3 per cent of the total for Canada, as against 55.5 per cent in 1920; Ontario, 26.9 per cent, as against 39.3 per cent in 1920; Quebec, 0.8 per cent, as against 1.1 per cent in 1920. Manitoba and the Yukon which were credited with 3.8 per cent and 0.3 per cent respectively in 1920, did not produce any copper in 1921.

Production of Copper in Canada by Provinces, 1919, 1920 and 1921

TABLE 39

Province	1919		1920		1921	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Quebec.....	2,691,695	503,105	880,638	153,724	352,308	44,045
Ontario.....	24,346,623	4,550,627	32,059,993	5,596,392	12,821,385	1,602,930
Manitoba.....	3,348,000	625,775	3,062,577	534,604		
British Columbia.....	44,502,079	8,317,884	45,319,771	7,911,019	34,447,127	4,306,580
Yukon.....	165,184	30,874	277,712	48,478		
Total.....	75,053,581	14,028,265	81,600,691	14,244,217	47,620,820	5,953,555

Percentage of Copper Production in Canada by Provinces

TABLE 40

Province	1919	1920	1921
Quebec.....	3.6	1.1	0.8
Ontario.....	32.5	39.3	26.9
Manitoba.....	4.4	3.8	
British Columbia.....	59.3	55.5	72.3
Yukon.....	0.2	0.3	
Total.....	100.0	100.0	100.0

Exports and Imports.—The exports and imports of copper are given below. It should be pointed out that the data given on copper imported during the war years are incomplete due to the fact that a large quantity of copper, imported for war purposes, was entered under the account of the Imperial Government and for customs purposes was included with many other products in one item. Imports of brass are included in the section on zinc.

Imports into Canada and Exports of Copper, 1919, 1920 and 1921

TABLE 41

	1919		1920		1921	
	Pounds	Value	Pounds	Value	Pounds	Value
<i>Imports—</i>						
Pigs, ingots or in blocks....	3,042,197	\$ 659,214	9,236,575	\$ 1,784,370	925,452	\$ 135,563
Old and scrap.....	1,010,000	138,023	2,481,100	404,161	307,900	37,955
Manufactures of copper—						
Bars, rods, sheets, tube and wire.....	26,266,918	5,665,502	36,808,834	7,406,018	19,999,600	3,080,833
Other manufactures.....		455,023		889,957		522,327
Crude precipitate.....	50	20	18	13	375	74
Copper sulphate.....	1,874,801	150,388	2,365,535	192,900	1,929,256	127,359
Total.....		*7,147,783		*10,736,206		*3,952,218
<i>Exports—</i>						
Fine in ore, matte, regulus, etc.....	40,851,300	5,316,151	47,329,700	5,918,782	10,511,500	1,029,220
Black or coarse and in pigs, bars, sheets, etc.....	18,192,300	4,186,549	2,666,500	710,978	3,253,600	497,383
Old and scrap.....	3,117,000	537,225	774,400	113,265	1,571,100	161,378
Blister copper.....	19,956,100	3,747,355	38,198,900	8,701,184	33,078,700	5,164,915
Wire and cable.....		867,360		433,097		569,648
Total.....	82,176,700	14,654,640	88,969,500	15,877,806	48,414,900	7,455,794

*There are also imports of copper ore and concentrate and of sub-acetate of copper, which are not included in this table, and which were not given separately previous to April, 1919. The imports in 1919, which cover 9 months only were: copper ore, etc., 3,369,100 pounds valued at \$78,983, and sub-acetate of copper, 1,344 pounds valued at \$630. The imports in 1920 were: copper ore, etc., 2,440,000 pounds valued at \$57,640, and sub-acetate of copper, 3,657 pounds valued at \$1,147. In 1921 the imports were 2,750,000 pounds copper ore valued at \$48,015 and 256 lbs. sub-acetate of copper valued at \$92.

Prices.—Trade conditions were severely affected by the fall in prices during 1920. In 1921 the average price for the twelve months was 12.502 cents with markets inactive. The prevailing monthly prices as published by the *Engineering and Mining Journal-Press* for the past three years, are shown as follows:—

Monthly Average Prices of Electrolytic Copper in New York

(In cents per pound)

TABLE 42

Months	1919	1920	1921
January.....	(a)	18.918	12.597
February.....	16.763	18.569	12.556
March.....	14.856	18.331	11.976
April.....	15.246	18.660	12.438
May.....	15.864	18.484	12.742
June.....	17.610	18.065	12.697
July.....	21.604	18.576	12.170
August.....	22.319	18.346	11.634
September.....	21.755	18.144	11.948
October.....	21.534	15.934	12.673
November.....	19.758	14.257	13.035
December.....	18.295	13.188	13.555
Yearly average.....	18.691	17.456	12.502

(a) No market.

Monthly Average Prices of Standard Copper in London

(In £ Sterling per ton of 2,240 pounds)

TABLE 43

Months	1919	1920	1921
January.....	92.238	118.095	70.964
February.....	78.700	120.188	70.925
March.....	76.821	109.533	67.565
April.....	77.300	103.025	69.381
May.....	77.767	96.750	73.196
June.....	83.062	87.864	71.852
July.....	99.576	90.148	71.155
August.....	97.300	93.935	68.614
September.....	100.767	96.381	67.977
October.....	103.418	93.327	67.327
November.....	98.894	84.807	66.614
December.....	103.708	75.702	66.706
Yearly average.....	90.796	97.480	69.356

QUEBEC

The production of copper in Quebec in 1921 was mainly derived as in the past from the copper pyrite ores of the Eastern Townships. The Weedon Mining Company only, reported operations; the Eustis mine which was active in 1920 was idle throughout the entire period. The total production amounted to 352,308 pounds valued at \$44,045 as against 880,638 pounds valued at \$153,724 in 1920.

This production represents the estimated recovery during the year from 516 tons of ore and from 4,216 tons of cinder shipped to United States smelters. During the year, the total mine shipments were 1,986 tons of ore, of which 1,470 tons was treated in Canada primarily for its sulphur content in the manufacture of sulphuric acid, while the balance was smelted directly in United States smelters for the copper contained.

Production of Copper in Quebec, 1886-1921

TABLE 44

Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
		\$			\$			\$
1886.....	3,340,000	367,400	1900.....	2,220,000	359,418	1914.....	4,201,497	571,488
1887.....	2,937,900	330,514	1901.....	1,527,442	246,178	1915.....	4,197,482	725,115
1888.....	5,562,864	927,107	1902.....	1,640,000	190,666	1916.....	5,703,347	1,551,424
1889.....	5,315,000	730,813	1903.....	1,152,000	152,467	1917.....	5,015,560	1,363,229
1890.....	4,710,606	741,920	1904.....	760,000	97,455	1918.....	5,869,649	1,445,577
1891.....	5,401,704	695,469	1905.....	1,621,243	252,752	1919.....	2,691,695	503,105
1892.....	4,883,480	564,042	1906.....	1,981,169	381,930	1920.....	880,638	153,724
1893.....	4,468,352	480,348	1907.....	1,517,990	303,659	1921.....	352,308	44,045
1894.....	2,176,430	208,067	1908.....	1,282,024	169,330			
1895.....	2,242,462	241,288	1909.....	1,088,212	141,272			
1896.....	2,407,200	261,903	1910.....	877,347	111,757			
1897.....	2,474,970	279,424	1911.....	2,436,190	301,503			
1898.....	2,100,235	252,658	1912.....	3,282,210	536,346			
1899.....	1,632,560	237,494	1913.....	3,455,887	527,679			
						Total...	93,407,653	16,498,566

ONTARIO

Most of the copper produced in Ontario is closely allied to the production of nickel and is derived principally from the nickel-copper ores of the Sudbury district. The decline in the demand for nickel during the year therefore had the effect of reducing the quantity of copper produced much below the average. During 1921 the copper production in Ontario amounted to 12,821,385 pounds

valued at \$1,602,930, as against 32,059,993 pounds valued at \$5,596,392 in 1920. Detailed statistics for copper from the nickel-copper ores are given under the item nickel, while the nickel-copper industry is described as a whole in the second part of this report.

Production of Copper in Ontario, 1886-1921

TABLE 45

Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
		\$			\$			\$
1886.....	165,000	18,150	1900.....	6,740,058	1,091,215	1914.....	28,948,211	3,937,536
1887.....	322,524	36,284	1901.....	8,695,831	1,401,507	1915.....	39,361,464	6,799,693
1888.....			1902.....	7,408,202	861,278	1916.....	44,997,035	12,240,094
1889.....	1,466,752	201,678	1903.....	7,172,533	949,285	1917.....	42,867,774	11,651,461
1890.....	1,303,065	205,233	1904.....	4,913,594	630,070	1918.....	47,074,475	11,593,502
1891.....	4,127,697	531,234	1905.....	8,779,259	1,368,686	1919.....	24,346,623	4,550,627
1892.....	2,203,795	254,538	1906.....	10,638,231	2,050,838	1920.....	32,059,993	5,596,392
1893.....	3,641,504	391,461	1907.....	14,104,337	2,821,432	1921.....	12,821,385	1,602,930
1894.....	5,207,679	497,854	1908.....	15,005,171	1,981,883			
1895.....	4,576,337	492,414	1909.....	15,746,699	2,044,237			
1896.....	3,167,256	344,598	1910.....	19,259,016	2,453,213			
1897.....	5,500,652	621,023	1911.....	17,932,263	2,219,297			
1898.....	8,375,223	1,007,539	1912.....	22,250,601	3,635,971			
1899.....	5,723,324	1,007,877	1913.....	25,885,929	3,952,522	Total...	502,789,492	91,043,552

The bounty offered by the Ontario Government on copper, 95 per cent pure and on copper sulphate produced from ore mined and refined in the province was never gained, and the act known as the "Metal Refining Bounty Act" warranting this bounty which expired April 10, 1917, was not re-enacted. The text of the act was quoted in the Annual Report on the Mineral Production of Canada. 1914, page 60.

MANITOBA

Copper was produced in Manitoba for the first time in 1917 and then continuously until 1920, but in 1921 with increasing costs of operating, high freight rates and other transportation difficulties, it was found impossible to operate and no copper ore was shipped in that year. The record to date is as follows: 1917—1,116,000 pounds valued at \$303,329; 1918—2,339,751 pounds valued at \$576,234; 1919—3,348,000 pounds valued at \$625,775; and 1920—3,062,577 pounds valued at \$534,604.

The above amounts were estimated as the copper recovered from ores shipped by the Mandy Mining Company operating near Schist Lake, in the Pas District of Northern Manitoba.

Much development has been carried on in this district during the past seven years. Towards the end of 1919 the Mandy Mining Company suspended operations, and has since sold its equipment, which has been installed on the Flin Flon group of claims on Flin Flon Lake in the same district. None of these copper properties reported any production during 1921. The Mining Corporation of Canada, which has secured a controlling interest in the Flin Flon group, carried on extensive development work by sinking and cross cutting, verifying the results of previous diamond drilling and proving large tonnages of ore to be in place.

A branch extension of the Hudson Bay Railway and smelter works are required for the economic treatment of the copper ores of this district.

¹ Report on the Schist Lake District, Northern Manitoba, by Dr. E. L. Bruce. Summary report of the Geological Survey of Canada for 1917, part D.

BRITISH COLUMBIA

The production of copper from British Columbia in 1921 amounted to 34,447,127 pounds, valued at \$4,306,580, as against 45,319,771 pounds valued at \$7,911,019, in 1920. The annual production from the province was 72·3 per cent of the total production for Canada in 1921 and 55·5 per cent in 1920.

This production included the copper content of the blister copper produced, which was partly refined at Trail and partly exported for refining in the United States; the copper equivalent of the copper sulphate produced at Trail and the estimated recoveries of copper from ores and concentrates exported, but it did not include the copper derived from the treatment of foreign ores or from ores of other provinces which were treated in British Columbia smelters.

Production of Copper in British Columbia, 1894-1921

TABLE 46

Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
		\$			\$			\$
1894*.....	324,680	31,039	1905*.....	37,692,251	5,876,222	1916.....	63,642,550	17,312,046
1895*.....	952,840	102,526	1906*.....	42,990,488	8,287,706	1917.....	57,730,959	15,691,275
1896*.....	3,818,556	415,459	1907*.....	40,832,720	8,168,177	1918.....	62,865,681	15,482,560
1897*.....	5,325,180	601,213	1908.....	37,041,115	4,892,390	1919.....	44,502,079	8,317,884
1898*.....	7,271,678	874,783	1909.....	35,658,952	4,629,245	1920.....	45,319,771	7,911,019
1899*.....	7,722,591	1,359,948	1910.....	33,270,006	4,492,693	1921.....	34,447,127	4,306,580
1900*.....	9,977,080	1,615,289	1911.....	35,279,558	4,366,198			
1901*.....	27,603,746	4,448,896	1912.....	50,526,656	8,256,561			
1902*.....	29,636,057	3,445,488	1913.....	45,791,579	6,991,916			
1903*.....	34,359,921	4,547,735	1914.....	41,219,202	5,606,636			
1904*.....	35,710,128	4,579,110	1915.....	56,692,988	9,793,714	Total...	930,206,139	162,404,308

*Metal contents of ores shipped as published by the Provincial Bureau of Mines.

Since 1909 the method of compilation of statistics of copper production by the Provincial Bureau of Mines of British Columbia, has been based upon ore shipments from the mines. The value of the product has been obtained by taking the amount of copper actually recovered thus covering smelter losses, a method which gives a result usually approximating that obtained by the Dominion Bureau of Statistics.

Production of Copper by Districts in British Columbia,
1919, 1920 and 1921*

(In Pounds)

TABLE 47

	1919	1920	1921
Cariboo—Omineca.....	16,205		26,000
Cassiar—			
Atlin, Liard and Stikine.....			25,664
Skeena.....	20,411,421	26,153,406	34,816,103
East Kootenay—			
Fort Steele.....			
Windermere.....		1,953	
West Kootenay—			
Slocan.....			
Nelson.....	21,984	755	3,183
Trail Creek.....	1,112,133	1,113,085	2,277,392
Yale—			
Boundary.....	3,273,655	582,360	432,505
Ashcroft and Kamloops.....	556,681	260,808	
Similkameen.....	5,180	463,347	
Southern Coast—			
Vancouver Island.....	432,252	110,696	44,770
Mainland.....	16,629,848	16,201,266	1,411,376
Totals.....	42,459,339	44,887,676	39,036,993

*As published by British Columbia Bureau of Mines.

Copper mining is one of the most important sections of the industry in the province, and in 1921 it contributed about 28 per cent of the total value from the metalliferous mines.

The main production in British Columbia is derived from the mines of the Pacific Coast and Cassiar district. Due to the recent slump in metal prices the copper industry has experienced a severe decline and many mines which produced ore in 1919 and 1920 were closed down in 1921.

Of the important producers, the Granby Consolidated Mining, Smelting and Power Company operated its Hidden Creek Group, and the Consolidated Mining and Smelting Company of Trail operated the Rossland group of mines. During the period the Emma Mine, an important shipper, operated by the latter company was closed down and dismantled. The Britannia Mining and Smelting Company which suffered a disastrous fire early in the year when the plant was destroyed, continued to ship from stocks. The Belmont Surf Inlet continued to operate, while the Marble Bay properties of the Tacoma Steel Company remained idle throughout the period.

YUKON

No production of copper was reported during 1921 from the Yukon District. During the war and when more favourable markets were to be had the production amounted to between one and two million pounds and occasionally higher. The following table shows the production.

Production of Copper in Yukon to 1921

TABLE 48

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1906 (and previous).....	156,000	23,400	1914.....	1,367,050	185,946
1907.....	511,838	102,388	1915.....	533,216	92,113
1908.....	112,264	14,828	1916.....	2,807,096	763,586
1909.....			1917.....	2,460,079	668,650
1910.....	286,000	36,431	1918.....	619,878	152,663
1911.....			1919.....	165,184	30,874
1912.....	1,772,660	289,670	1920.....	277,712	48,478
1913.....	1,843,530	281,489	1921.....		
			Total.....	12,912,507	2,690,516

GOLD

CANADA

The production of gold from all sources in Canada during the calendar year 1921 amounted to 926,329 fine ounces, valued at \$19,148,920, or an increase of slightly over 21 per cent above the previous year, when 765,007 fine ounces, valued at \$15,814,098 was produced.

The production for 1921 was derived from (a) alluvial gold, 77,246 ounces; (b) gold obtained from milling ores, 711,121 ounces; (c) gold obtained from ores treated at Canadian copper and lead smelters, 52,822 ounces; and (d) the estimated gold recoveries from ores and concentrates exported, 85,140 ounces. The corresponding figures for the year 1920 were: (a) 83,469, (b) 581,455, (c) 45,886 ounces, and (d) 54,197 ounces.

The production of gold by provinces was: Nova Scotia 439 ounces or .05 per cent of the total for Canada; Quebec, 635 ounces, or .07 per cent; Ontario, 708,213 ounces, or 76.45 per cent; Manitoba, 207 ounces, or .02 per cent; Alberta, 49 ounces; British Columbia 150,792 ounces, or 16.27 per cent; and the Yukon Territory 65,994 ounces or 7.14 per cent.

The large increase in the production of gold was due primarily to the expansion of the operating gold mines in Ontario, the output from which exceeded the 1920 record by over 25 per cent. With the opening up of some new producing mines, British Columbia's production increased by about 20 per cent although some mines, formerly important producers, remained idle. Nova Scotia, Manitoba and Quebec all showed considerable decreases in gold production.

Production of Gold in Canada, 1858-1921

TABLE 49

Year	Fine ounces‡	Value	Year	Fine ounces‡	Value	Year	Fine ounces‡	Value
		\$			\$			\$
1858.....	34,104	705,000	1881.....	63,524	1,313,153	1904.....	796,374	16,462,517
1859.....	78,129	1,615,072	1882.....	60,288	1,246,268	1905.....	684,951	14,159,195
1860.....	107,806	2,228,543	1883.....	53,853	1,113,246	1906.....	556,415	11,502,120
1861.....	128,973	2,666,118	1884.....	51,202	1,058,439	1907.....	405,517	8,382,780
1862.....	135,391	2,798,774	1885.....	55,575	1,148,829	1908.....	476,112	9,842,105
1863.....	202,498	4,186,011	1886.....	70,782	1,463,196	1909.....	453,865	9,382,230
1864.....	199,605	4,126,199	1887.....	57,460	1,187,804	1910.....	493,707	10,205,835
1865.....	192,898	3,987,562	1888.....	53,145	1,098,610	1911.....	473,159	9,781,077
1866.....	152,555	3,153,597	1889.....	62,653	1,295,159	1912.....	611,885	12,648,794
1867.....	145,775	3,013,431	1890.....	55,620	1,149,776	1913.....	802,973	16,598,923
1868.....	134,169	2,773,527	1891.....	45,018	930,614	1914.....	773,178	15,983,007
1869.....	102,720	2,123,405	1892.....	43,905	907,601	1915.....	918,056	18,977,901
1870.....	83,415	1,724,348	1893.....	47,243	976,603	1916.....	930,492	19,234,976
1871.....	105,187	2,174,412	1894.....	54,600	1,128,688	1917.....	738,831	15,272,992
1872.....	90,283	1,866,321	1895.....	100,798	2,083,674	1918.....	699,681	14,463,689
1873.....	74,346	1,536,871	1896.....	133,262	2,754,774	1919.....	766,764	15,850,423
1874.....	97,856	2,022,862	1897.....	291,557	6,027,016	1920.....	765,007	15,814,098
1875.....	130,300	2,693,533	1898.....	666,386	13,775,420	1921.....	923,329	19,148,920
1876.....	97,729	2,020,233	1899.....	1,028,529	21,261,584			
1877.....	94,304	1,949,444	1900.....	1,350,057	27,908,153			
1878.....	74,420	1,538,394	1901.....	1,167,216	24,128,503			
1879.....	76,547	1,582,358	1902.....	1,032,161	21,336,667			
1880.....	63,121	1,304,824	1903.....	911,559	18,843,590			
						Total.....	22,331,820	461,639,788

‡ Calculated from the value: one dollar = 0.048375 oz.

Summary of Gold Statistics for Canada, 1919, 1920, and 1921

TABLE 50

		1919	1920	1921
Gold ores and concentrates shipped (a).....	{Tons.	5,229	8,456	16,311
	{Value.	\$298,222	\$187,635	\$1,915,747
Gold bullion shipped from quartz mines.....	{Tons.	29	27	31
	{Value.	\$10,972,559	\$12,088,474	\$14,774,036
Gold bullion shipped by placer operators.....	{Tons.	4.0	3.5	3.2
	{Value.	\$1,990,664	\$1,741,992	\$1,595,804
Gold production (b).....	{Fine ounces	766,764	765,007	926,329
	{Value.	\$15,850,423	\$15,814,098	\$19,148,920
Production by provinces:—				
Nova Scotia.....	Ozs.	850	690	439
Quebec.....	"	1,470	955	635
Ontario.....	"	505,739	564,995	708,213
Manitoba.....	"	724	781	207
Alberta.....	"	24		49
British Columbia.....	"	167,252	124,808	150,792
Yukon.....	"	90,705	72,778	65,994
Imports of gold.....	Value.	\$477,412	\$882,008	\$597,497
Exports of gold.....	"	\$5,037,123	\$4,642,909	\$2,560,524

(a) The greater portion of the gold ores are treated in the reduction plants, at the mines. Thus these figures of shipments represent only a small proportion of the output from the mines.

(b) Includes gold from gold milling ores, copper ores and lead-zinc ores.

Refined Metal.—There were two refineries producing fine gold in Canada, namely, the Royal Mint, Ottawa, Ont., and that of the Consolidated Mining and Smelting Company of Canada, Ltd., at Tadanac, near Trail, B.C. From all ores treated during 1921, the latter company produced 56,297 fine ounces of gold. This gold was recovered principally from the gold and copper ores, but also from silver-lead, and dry ores. Small quantities of imported ores were also treated by this company.

Refined Gold Produced at Trail, B.C.*

TABLE 51

Calendar Year	Gold Fine oz.	Calendar Year	Gold Fine oz.
1904.....	4,336	1913.....	11,977
1905.....	8,602	1914.....	11,088
1906.....	9,993	1915.....	17,813
1907.....	10,395	1916.....	23,608
1908.....	15,346	1917.....	49,661
1909.....	18,241	1918.....	61,212
1910.....	13,298	1919.....	47,283
1911.....	15,270	1920.....	42,636
1912.....	12,118	1921.....	56,297

*Includes some gold derived from imported ores and from occasional shipments from Ontario, Manitoba, Alberta, and the Yukon.

Receipts of Gold Bullion at the Royal Mint, Ottawa, Ont.

TABLE 52

Calendar Year	From Canadian Sources		From Foreign Countries	
	Oz. Gross	Value Gold Contents	Oz. Gross	Value Gold Contents
		\$		\$
1908.....	219·19	3,823 03		
1909.....	5,741·43	94,864 81	38·25	673 98
1910.....	65,009·35	1,079,223 42		
1911.....	89,463·11	1,469,087 43	511·24	9,128 55
1912.....	104,825·29	1,676,371 78	742·79	12,451 33
1913.....	212,076·41	3,363,870 30	633·23	11,609 84
1914.....	29,762·24	471,042 90	4,750·19	98,062 84
1915.....	89,231·47	1,402,605 19	871,693·79	15,838,222 01
1916.....	49,195·39	780,074 19	6,687,758·41	121,513,083 93
1917.....	55,779·96	840,265 33	8,196,151·04	148,919,793 48
1918.....	302,785·96	4,982,743 81	3,728,224·05	67,739,887 68
1919.....	654,906·28	10,865,770 57	8,917·02	134,756 38
1920.....	724,083·34	11,530,413 82		
1921.....	1,054,277·01	16,914,211 58	53·00	826 87

In addition to the above, the Mines Branch of the Department of Mines operated the Vancouver Assay Office where crude bullion, nuggets and dust, were bought, melted, and sold. The receipts for the past fourteen years are tabulated as follows:—

Receipts at Dominion Assay Office, Vancouver, B.C.

TABLE 53

Year	Weight before melting	Weight after melting	Net value	Year	Weight before melting	Weight after melting	Net value
	ounces	ounces	\$		ounces	ounces	\$
1908 (a).....	90,175.48	89,117.76	1,478,894 00	1915.....	183,924.49	179,751.68	2,736,302 31
1909.....	48,478.58	47,576.27	789,267 94	1916.....	180,292.83	175,393.10	2,828,239 65
1910.....	46,064.31	45,228.92	746,101 92	1917.....	191,626.04	187,884.48	3,257,220 71
1911.....	39,784.70	39,069.31	647,416 38	1918.....	241,762.77	238,245.07	4,099,595 80
1912.....	59,068.82	57,951.98	974,077 14	1919.....	209,026.14	205,947.57	3,547,524 93
1913 (b).....	111,479.94	109,920.49	1,448,625 37	1920.....	150,869.17	147,718.25	2,499,174 41
1914.....	166,148.83	163,523.61	2,029,251 31	1921.....	163,070.56	160,803.48	2,834,499 61

(a) for 9 months only. (b) The removal of the assay charge in January 1913, accounts for the large increase.

Imports of Gold into Canada, 1919, 1920 and 1921

TABLE 54

Item	1919	1920	1921
	\$	\$	\$
Gold—			
Fringe.....	17,949	36,919	62,519
Manufactures of Gold and Silver—			
Leaf.....	36,105	108,788	47,123
Sweepings.....	5,303	6,605	2,771
Manufactures, n.o.p.....	136,612	184,681	97,110
Electroplated ware.....	281,443	545,015	387,974

NOVA SCOTIA

The gold production in Nova Scotia has been derived almost entirely from quartz ores and in 1921 it amounted to 439 fine ounces, valued at \$9,075, as against 690 fine ounces, valued at \$14,263, in 1920.

The 1921 production was the smallest recorded and the falling off during the past few years is attributed partly, as in other gold districts, to the high cost of supplies and labour, and partly to the exhaustion of the mines. Many small customs gold mills which were formerly operated in this province have been closed down. As mentioned in the description of the gold mining industry, only three companies carried on development work of any account.

Production of Gold in Nova Scotia, 1862-1921

TABLE 55

Year	Tons treated	Fine ounces	Value	Yield of gold per ton	Year	Tons treated	Fine ounces	Value	Yield of gold per ton
			\$	\$				\$	\$
1862....	6,473	6,863	141,871	21 91	1894....	55,357	18,834	389,338	7 04
1863....	17,000	13,180	272,448	16 02	1895....	60,600	21,919	453,119	7 47
1864....	21,431	18,883	390,349	18 21	1896....	69,169	23,876	493,568	7 13
1865....	24,421	24,011	496,357	20 32	1897....	73,192	27,195	562,165	7 68
1866....	32,157	23,776	491,491	15 28	1898....	82,747	26,054	538,590	6 50
1867....	31,384	25,763	532,563	16 96	1899....	112,226	29,876	617,604	5 50
1868....	32,259	19,377	400,555	12 41	1900....	87,390	28,955	598,553	6 85
1869....	35,144	16,855	348,427	19 91	1901....	91,948	26,459	546,963	5 32
1870....	30,824	18,740	387,392	12 56	1902....	93,042	30,348	627,357	6 68
1871....	30,787	18,139	374,972	12 17	1903....	103,856	25,533	527,806	5 08
1872....	17,089	12,352	255,349	14 94	1904....	45,436	10,362	214,209	4 71
1873....	17,708	11,180	231,122	13 05	1905....	57,774	13,707	283,353	4 90
1874....	13,844	8,623	178,244	12 87	1906....	66,059	12,223	252,676	3 82
1875....	14,810	10,576	218,629	14 76	1907....	58,550	13,675	282,686	4 82
1876....	15,490	11,300	233,585	15 08	1908....	61,536	11,842	244,799	3 97
1877....	17,369	15,925	329,205	18 95	1909....	56,790	10,193	210,711	3 71
1878....	17,989	11,864	245,253	13 63	1910....	43,006	7,928	163,891	3 81
1879....	15,936	12,980	268,328	16 83	1911....	18,328	7,781	160,854	8 78
1880....	13,997	12,472	257,823	18 42	1912....	14,360	4,385	90,638	6 51
1881....	16,556	10,147	209,755	12 66	1913....	7,324	2,174	44,935	6 13
1882....	21,081	13,307	275,090	13 04	1914....	13,156	2,904	60,031	4 56
1883....	25,954	14,571	301,207	11 60	1915....	25,204	6,636	137,180	5 44
1884....	25,186	15,168	313,554	12 44	1916....	17,497	4,562	94,305	5 38
1885....	28,890	20,945	432,971	14 98	1917....	5,916	2,210	45,685	7 72
1886....	29,010	22,038	455,564	15 70	1918....	1,630	1,176	24,310	14 91
1887....	32,280	20,009	413,631	12 81	1919....	1,362	850	17,571	12 90
1888....	36,178	21,137	436,939	12 08	1920....	858	690	14,263	16 62
1889....	39,160	24,673	510,029	13 02	1921....	626	*418	8,641	13 80
1890....	42,749	22,978	474,990	11 11					
1891....	36,351	21,841	451,503	12 42					
1892....	32,552	18,865	389,965	11 98					
1893....	42,354	18,436	381,095	8 99	Total...	2,191,212	909,739	18,806,057	8 58

*439 fine ounces reported as received by Royal Mint from Nova Scotia, 21 of which came from old ore dumps.

QUEBEC

The gold production in Quebec during 1921 amounted to 635 fine ounces valued at \$13,127 as against 955 fine ounces valued at \$19,742 in 1920.

The production for this year was derived almost entirely from the zinc-lead ores of Notre Dame des Anges, Portneuf County. In other years the output was considerably augmented by the gold contained in the pyritic ores of the Eastern Townships which are worked chiefly for their sulphur contents. During the period the pyritic ore output fell off considerably. No alluvial production has been reported for a number of years.

Development and exploration continued to be carried on in Du Buisson township, Temiskaming District, and in the Hurricanaw, about 40 miles south of Amos.

Production of Gold in Quebec, 1877-1921

TABLE 56

Year	Fine ounces ‡	Value	Year	Fine ounces ‡	Value	Year	Fine ounces ‡	Value
		\$			\$			\$
1877.....	583	12,057	1894.....	1,412	29,196	1911.....	613	12,672
1878.....	868	17,937	1895.....	62	1,281	1912.....	642	13,270
1879.....	1,160	23,972	1896.....	145	3,000	1913.....	701	14,491
1880.....	1,605	33,174	1897.....	44	900	1914.....	1,292	26,708
1881.....	2,741	56,661	1898.....	295	6,089	1915.....	1,099	22,720
1882.....	827	17,093	1899.....	238	4,916	1916.....	1,034	21,375
1883.....	860	17,787	1900.....			1917.....	1,511	31,235
1884.....	422	8,720	1901.....	145	3,000	1918.....	1,939	40,083
1885.....	103	2,120	1902.....	391	8,073	1919.....	1,470	30,388
1886.....	193	3,981	1903.....	180	3,712	1920.....	955	19,742
1887.....	78	1,604	1904.....	140	2,900	1921.....	635	13,127
1888.....	181	3,740	1905.....	191	3,940			
1889.....	58	1,207	1906.....	165	3,412			
1890.....	65	1,350	1907.....					
1891.....	87	1,800	1908.....					
1892.....	628	12,987	1909.....	193	3,990			
1893.....	759	15,696	1910.....	124	2,565	Total.....	26,834	534,671

‡ Calculated from the value: one dollar = 0.048375 ounce.

The principal operator in 1919 was the British Minerals Corporation, Limited, which carried on development on the Sullivan and Siscoe properties. No operations were reported in 1920 or 1921.

Reports on this area were published by the Quebec Bureau of Mines in the Annual Report for the years 1912¹ and 1919².

ONTARIO

The gold production of Ontario in 1921 amounted to 708,213 fine ounces, valued at \$14,640,062, as against 564,995 fine ounces, valued at \$11,679,483, in 1920, showing an increase of 25.3 per cent.

Since 1914 Ontario has become by far the largest producer of gold in Canada and this remarkable increase was brought about by the successful development of the Porcupine and Kirkland Lake districts and by the extension of milling facilities in these camps. The falling off in production during 1917 and 1918 was due to the abnormal conditions created by the war. The production increased during 1919 and 1920, and in the year 1921 was the greatest recorded. A favourable factor in gold production was the exchange premium; all gold sold to the Royal Mint was paid for in New York funds. In 1920 the United States dollar had an average exchange value in Canadian funds of \$1.1227 and \$1.1161 in 1921.

The principal producers during 1921 in order of importance were:—

Porcupine District.—Hollinger Consolidated Gold Mines, Ltd., Timmins. Dome Mines Co., Ltd., South Porcupine. McIntyre Porcupine Mines, Ltd., Schumacher. North Crown Porcupine Mines, Ltd., Timmins.

Kirkland Lake District.—Lake Shore Mines, Limited, Kirkland Lake. Wright-Hargraves Mines, Ltd., Kirkland Lake. Teck Hughes Gold Mines, Ltd., Kirkland Lake. Kirkland Lake Gold Mining Company, Kirkland Lake.

Larder Lake District.—Argonaut Gold, Limited, Beaver House Lake.

¹ Quebec Bureau of Mines Annual Report, 1912, pp. 217-229.

² Quebec Bureau of Mines Annual Report, 1919, pp. 125-158.

Considerable development work has been carried on during the last few years in many areas of Temiskaming, the most important being the extension of the Kirkland Lake Area towards the east; Goodfish Lake; Boston Creek; Bourkes, Matheson and Sesequinika stations, on the Temiskaming and Northern Ontario Railway; Matachewan, Lightning River, and Larder Lake areas. Reports on these areas have been published by the Ontario Bureau of Mines.¹

Much exploration and development has been done also in the new West Shining Tree gold area, Sudbury district.²

In 1921 important development work was carried on in the Goudreau Lake area³ north of Sault Ste. Marie, Michipicoten district. Some work was also carried on in the area east of Wanipitie Lake.⁴

Production of Gold in Ontario, 1887-1921

TABLE 57

Year	Fine ounces ‡	Value	Year	Fine ounces ‡	Value	Year	Fine ounces ‡	Value
		\$			\$			\$
1887.....	327	6,760	1900.....	14,391	297,495	1913.....	219,801	4,543,690
1888.....			1901.....	11,844	244,837	1914.....	268,264	5,545,509
1889.....			1902.....	11,118	229,828	1915.....	406,577	8,404,693
1890.....			1903.....	9,096	188,036	1916.....	492,481	10,180,485
1891.....	97	2,000	1904.....	1,935	40,000	1917.....	423,261	8,749,581
1892.....	344	7,118	1905.....	4,402	91,000	1918.....	411,976	8,516,299
1893.....	708	14,637	1906.....	3,202	66,193	1919.....	505,739	10,454,553
1894.....	1,917	39,624	1907.....	3,212	66,398	1920.....	564,995	11,679,483
1895.....	3,015	62,320	1908.....	3,212	66,398	1921.....	708,213	14,640,062
1896.....	5,563	115,000	1909.....	1,569	32,425			
1897.....	9,157	189,294	1910.....	3,089	63,849			
1898.....	12,863	265,889	1911.....	2,062	42,625			
1899.....	20,394	421,591	1912.....	86,523	1,788,596	Total...	4,211,347	87,056,268

‡ Calculated from the value: one dollar = 0.048375 ounce.

MANITOBA

The gold production in Manitoba during 1920 amounted to 207 fine ounces, valued at \$4,279, as against 781 fine ounces, valued at \$16,145, in 1920; 724 ounces, valued at \$14,966, in 1919; 1,926 ounces, valued at \$39,814, in 1918; and 440 ounces, valued at \$9,095, in 1917. There was no production recorded prior to 1917.

Late in 1921 interesting finds were reported from the Elbow Lake district north of The Pas and many claims were staked. Operations were also carried on east of Lake Winnipeg in the Managotogan district. A report on the geology and mineral resources of the Rice Lake and Oiseau River areas of Manitoba was published by the Geological Survey during the year.

SASKATCHEWAN

In the autumn of 1913 considerable interest was created in the reported gold discoveries at Beaver Lake (Amisk Lake). A number of prospectors went in with the opening of navigation. A good deal of prospecting was done during 1914, and some further work in 1915, but as yet no production has been reported.

¹(a) Boston Creek and Goodfish Lake Gold Areas. Bul. No. 29, Ontario Bureau of Mines, 1916.

(b) Matachewan Gold Area, Bul. No. 34, Ontario Bureau of Mines, 1918.

(c) Abitibi-Night Hawk Gold Area, Vol. XXVIII, Part II, 28th Annual Report, Ontario Bureau of Mines, 1919.

(d) Larder Lake Gold Area, Vol. XXVIII, Part II, 28th Annual Report, Ontario Bureau of Mines, 1919.

²West Shining Tree Gold Area: Bul. No. 39, Ontario Bureau of Mines, 1920.

³Goudreau Gold Area, Summary Report No. 21, Part D.

⁴Wanapitie Lake Map Area, Summary Report, 21, Part D.

ALBERTA

Small quantities of gold have been recovered every year from the gravels of the Saskatchewan River by individuals. These small lots are usually sold through the banks at Edmonton, which reported having received during the calendar year 1921 some 55 crude ounces containing 49 fine ounces of gold valued at \$1,013. This gold came from the Peace River area in the vicinity of the British Columbia-Alberta boundary. In 1919 some 24 ounces valued at \$500 was recovered and in 1920 no production was reported.

Production of Gold in Alberta, 1887-1921

TABLE 58

Year	Fine ounces ‡	Value	Year	Fine ounces ‡	Value	Year	Fine ounces ‡	Value
		\$			\$			\$
1887.....	102	2,100	1900.....	242	5,000	1913.....		
1888.....	58	1,200	1901.....	726	15,000	1914.....	48	992
1889.....	967	20,000	1902.....	484	10,000	1915.....	195	4,026
1890.....	193	4,000	1903.....	48	1,000	1916.....	82	1,695
1891.....	266	5,500	1904.....	24	500	1917.....		
1892.....	508	10,506	1905.....	121	2,500	1918.....	27	558
1893.....	466	9,640	1906.....	39	800	1919.....	24	500
1894.....	726	15,000	1907.....	33	675	1920.....		
1895.....	2,419	50,000	1908.....	50	1,037	1921.....	49	1,013
1896.....	2,661	55,000	1909.....	25	525			
1897.....	2,419	50,000	1910.....	89	1,850			
1898.....	1,209	25,000	1911.....	10	207			
1899.....	726	15,000	1912.....	73	1,509	Total...	15,109	312,333

‡ Calculated from the value: one dollar = 0.048375 ounce.

BRITISH COLUMBIA

The gold production of British Columbia in 1921 amounted to 150,792 fine ounces, valued at \$3,117,147, as against 124,808 fine ounces, valued at \$2,580,010, in 1920. This represented an increase of about 20 per cent. The production from this province amounted to 16.27 per cent of the total for Canada.

The production in 1921 included (a) alluvial gold, 11,281 fine ounces or 7.5 per cent of the total for the province; (b) bullion from milling ores, 3,311 ounces or 2.2 per cent; (c) smelter recoveries, 52,643 ounces or 34.9 per cent and (d) the estimated recoveries from ores and concentrates exported, 83,557 ounces or 55.4 per cent. The corresponding quantities for 1920 were (a) 10,719 ounces or 8.8 per cent; (b) 16,672 ounces or 13.4 per cent; (c) 44,382 ounces or 35.6 per cent and (d) 53,035 ounces or 42.5 per cent. The amounts shown for alluvial gold are as published by the provincial Mineralogist while those for bullion from milling ores and smelter recoveries have been compiled from reports received from operators and smelters. The production in British Columbia is gradually increasing and although bullion from milling ores shows a heavy decrease due to the inactivity of the Nickel Plate Mine (Hedley Gold Mining Company) during the year, the production from exported ores has gained, largely through the developments at the Premier Mine. An aerial tram at this property has facilitated the shipment of high grade ores and concentrates.

Production of Gold in British Columbia, 1858-1921

TABLE 59

Year	Fine ounces ‡	Value	Year	Fine ounces ‡	Value	Year	Fine ounces ‡	Value
		\$			\$			\$
1858.....	34,104	705,000	1880.....	49,044	1,013,827	1902.....	288,383	5,961,409
1859.....	78,129	1,615,072	1881.....	50,636	1,046,737	1903.....	284,108	5,873,036
1860.....	107,806	2,228,543	1882.....	46,154	954,085	1904.....	275,975	5,704,908
1861.....	128,973	2,666,118	1883.....	38,422	794,252	1905.....	285,529	5,902,402
1862.....	128,528	2,656,903	1884.....	35,612	736,165	1906.....	269,886	5,579,039
1863.....	189,318	3,913,563	1885.....	34,527	713,738	1907.....	236,216	4,883,020
1864.....	180,722	3,735,850	1886.....	43,714	903,651	1908.....	286,853	5,929,880
1865.....	168,887	3,491,205	1887.....	33,558	693,709	1909.....	250,320	5,174,579
1866.....	128,779	2,662,106	1888.....	29,834	616,731	1910.....	261,386	5,403,318
1867.....	120,012	2,480,868	1889.....	28,489	588,923	1911.....	238,496	4,930,145
1868.....	114,792	2,372,972	1890.....	23,918	494,436	1912.....	251,815	5,205,485
1869.....	85,865	1,774,978	1891.....	20,792	429,811	1913.....	297,459	6,149,027
1870.....	64,675	1,336,956	1892.....	19,327	399,525	1914.....	252,730	5,224,393
1871.....	87,048	1,799,440	1893.....	18,360	379,535	1915.....	273,376	5,651,184
1872.....	77,931	1,610,972	1894.....	25,664	530,530	1916.....	219,633	4,540,216
1873.....	63,166	1,305,749	1895.....	61,289	1,266,954	1917.....	133,742	2,764,693
1874.....	89,233	1,844,618	1896.....	86,504	1,788,206	1918.....	180,163	3,724,300
1875.....	119,724	2,474,904	1897.....	131,805	2,724,657	1919.....	167,252	3,457,406
1876.....	86,429	1,786,648	1898.....	142,215	2,939,852	1920.....	124,808	2,580,010
1877.....	77,796	1,608,182	1899.....	203,295	4,202,473	1921.....	150,792	3,117,147
1878.....	61,688	1,275,204	1900.....	228,916	4,732,105			
1879.....	62,407	1,290,058	1901.....	257,292	5,318,703	Total.....	8,594,306	177,660,111

‡ Calculated from the value: one dollar = 0.048375 ounces.

The statistics reported by the Provincial Bureau of Mines covering 1921 production follow. The quantities given for lode gold production, which are based on the metal contents of ores shipped, are as a rule, somewhat higher than the record of smelter recoveries.

Production of Gold in British Columbia by Districts, 1920 and 1921*

TABLE 60

Districts	1920				1921			
	Gold Placer		Gold Lode		Gold Placer		Gold Lode	
	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value
Cariboo:—		\$		\$		\$		\$
Cariboo and Quesnel.....	3,300	66,000			3,370	67,400		
Omineca.....	150	3,000	218	4,506	150	3,000	13	269
Cassiar:—								
Atlin, Liard and Stikine.....	6,930	138,600			7,210	144,200	3	62
Skeena, etc.....	150	3,000	54,531	1,127,156	100	2,000	85,182	1,760,713
East Kootenay:—								
Fort Steele.....	175	3,500			180	3,600	1	20
Windermere and Golden.....								
West Kootenay:—								
Ainsworth.....			32	661			11	227
Nelson.....	25	500	1,924	39,769	50	1,000	3,587	74,143
Slocan and Slocan City.....			73	1,509			19	393
Trail Creek.....			36,425	752,905			44,980	929,737
Revelstoke, etc.....	50	1,000	7	145	50	1,000	8	165
Yale:—								
Grand Forks, Greenwood and Osoyoos.....	25	500	20,366	420,965	25	500	735	15,192
Similkameen, Nicola and Vernon.....	25	500	83	1,716	50	1,000		
Yale, Ashcroft and Kamloops.....	50	1,000	238	4,919	50	1,000		
Lillooet:—								
Lillooet.....	175	3,500	120	2,480	400	8,000	374	7,730
Southern Coast:—								
Vancouver Island.....	25	500	19	393	25	500	104	2,150
Mainland.....			6,012	124,268			646	13,353
Total.....	11,080	221,600	120,048	2,481,392	11,660	233,200	135,663	2,804,154

* From Annual Report of the Minister of Mines for British Columbia.

YUKON

The gold production from the Yukon in 1921 was derived from the alluvial sands of Dawson and Whitehorse districts and showed a slight decrease from the record of the previous year. The figures for 1921 were 65,994 fine ounces, valued at \$1,364,217, which included 65,916 ounces from alluvial sands and 78 ounces from lead ores shipped to United States smelters, as against 72,778 fine ounces, valued at \$1,504,455, in 1920. Of the 1920 production 28 ounces was recovered in lode mining.

The number of crude ounces of gold on which bounty was paid was 82,394, and included 65,916 fine ounces gold valued at \$1,362,604, and 14,831 fine ounces of silver valued at \$9,292, or a total value of \$1,363,534. For 1920 the corresponding figures were 90,938 crude ounces, containing 72,750 fine ounces gold, valued at \$1,503,876, and 16,369 fine ounces silver valued at \$16,516, or a total value of \$1,520,392.

The following table shows statistics of gold produced in the Yukon during the past 35 years. Between the years 1898 and 1906 the figures were based upon receipts of gold at the United States mints and receiving offices, credited to the Canadian Yukon.

Production of Gold in Yukon, 1885-1921

TABLE 61

Year	Fine Ounces ‡	Value	Year	Fine Ounces ‡	Value	Year	Fine Ounces ‡	Value
		\$			\$			\$
1885).....	4,837	100,000	1899.....	774,000	16,000,000	1913.....	282,838	5,846,780
1886).....			1900.....	1,077,553	22,275,000	1914.....	247,940	5,125,374
1887.....	3,386	70,000	1901.....	870,750	18,000,000	1915.....	230,173	4,758,098
1888.....	1,935	40,000	1902.....	701,437	14,500,000	1916.....	212,700	4,396,900
1889.....	8,466	175,000	1903.....	592,594	12,250,000	1917.....	177,667	3,672,703
1890.....	8,466	175,000	1904.....	507,938	10,500,000	1918.....	102,474	2,118,325
1891.....	1,935	40,000	1905.....	381,001	7,876,000	1919.....	90,705	1,875,039
1892.....	4,233	87,500	1906.....	270,900	5,600,000	1920.....	72,778	1,504,455
1893.....	8,514	176,000	1907.....	152,381	3,150,000	1921.....	65,994	1,364,217
1894.....	6,047	125,000	1908.....	174,150	3,600,000			
1895.....	12,094	250,000	1909.....	191,565	3,960,000			
1896.....	14,513	300,000	1910*.....	221,091	4,570,362			
1897.....	120,937	2,500,000	1911.....	224,197	4,634,574			
1898.....	483,750	10,000,000	1912.....	268,447	5,549,296	Total...	8,570,386	177,165,623

‡Calculated from the value: one dollar=0.048375 oz.

*Including a small production from lode mines, from 1910 to 1919 inclusive.

Since 1906 a royalty of $2\frac{1}{2}$ per cent has been collected by the Canadian Government which places a nominal value of \$15 per crude ounce recovered. The statistics shown for these years are based on the returns supplied by the Mining Lands and Yukon Branch of the Department of the Interior, in which the fine gold is estimated as 80 per cent of all crude gold, fine silver as 12 per cent, and the remaining 8 per cent regarded as worthless base metals.

The Vancouver Assay Office, which is operated by the Department of Mines, Ottawa, receives and melts a considerable portion of the placer gold from the Yukon. During 1921 there was deposited from this territory 82,219.92 ounces, valued, after all charges had been deducted, at \$1,340,224.97, or \$16.30 per ounce, as against 74,456.01 ounces, valued at \$1,206,579, or \$16.21 per ounce in 1920.

Receipts from the Yukon, at the Dominion Government Assay Office, Vancouver, B.C., 1908-1921

TABLE 62

Year	Weight before Melting	Net Value	Average Value	Year	Weight before Melting	Net Value	Average Value
	Ounces	\$	\$		Ounces	\$	\$
1908 (a).....	60,132.00	1,000,296	16.63	1915.....	87,040.87	1,418,497	16.28
1909.....	5,003.12	83,871	16.75	1916.....	95,005.82	1,525,724	16.06
1910.....	3,594.87	62,094	17.27	1917.....	79,532.35	1,262,207	15.87
1911.....	2,073.61	34,994	16.88	1918.....	121,310.37	1,921,198	15.84
1912.....	2,211.88	36,481	16.41	1919.....	111,138.65	1,813,883	16.32
1913 (b).....	15,235.29	247,189	16.22	1920.....	74,456.01	1,206,579	16.21
1914.....	56,564.83	915,914	16.21	1921.....	82,219.92	1,340,225	16.30

(a) For nine months only.

(b) The removal in 1913 of the assay charge accounts for the great increase.

Production of Crude Gold in the Yukon District

(Gross weight of dust, nuggets, and bullion in ounces)

TABLE 63

Month	1919	1920	1921
January.....	2,609.39	280.78	813.77
February.....	491.22	18.00	622.22
March.....	742.75	9,497.14	22.85
April.....	1,666.40	140.52	36.18
May.....	3,978.07	44.42	
June.....	18,255.81	10,505.24	14,717.00
July.....	12,084.24	11,018.56	13,585.40
August.....	19,939.34	12,865.26	14,742.48
September.....	12,201.85	8,575.41	11,773.73
October.....	36,641.55	32,243.87	22,106.00
November.....	2,040.88	3,992.30	3,183.19
December.....	2,612.82	1,756.72	791.75
	113,264.32	90,938.02	82,394.57

Between 1898 and March 31, 1922, a royalty to the extent of \$4,809,094.77 has been collected on the gold production of this district. The yearly amounts collected, as well as the annual production of gold as ascertained by the Department of the Interior, are shown below. The difference between these figures and those shown in the table of annual production, which are based on mint receipts of Yukon gold is probably due to three factors: (1) the fixing of the value of the gold for royalty purposes at \$15 per ounce, (2) the probability that, in the earlier years of royalty collection, considerable quantities of gold dust left the camps unrecorded and escaped royalty payments, and (3) the fact that in the last few years there has been a small production from lode mines.

Gold Production in the Yukon and the Royalty Collected*

TABLE 64

Fiscal Year	Total Gold Production	Total Exemption	Royalty Collected on	Royalty Paid
	\$	\$	\$	\$ cts.
Ending June, 1898.....	3,072,773	339,845	2,732,928	273,292 82
Ending June, 1899.....	7,582,283	1,699,657	5,882,626	588,262 37
Ending June, 1900.....	9,809,465	2,501,744	7,307,720	730,771 99
Ending June, 1901.....	9,162,083	1,927,666	7,234,416	592,660 98
Ending June, 1902.....	9,566,340	1,199,114	8,367,226	331,436 79
Ending June, 1903.....	12,113,015		12,113,015	302,893 48
Ending June, 1904.....	10,790,663		10,790,663	272,217 96
Ending June, 1905.....	8,222,054		8,222,054	206,760 87
Ending June, 1906.....	6,540,007		6,540,007	163,963 25
Ending March, 1907.....	3,304,791		3,304,791	82,622 42
Ending March, 1908.....	2,820,162		2,820,162	70,504 65
Ending March, 1909.....	3,260,283		3,260,282	81,507 07
Ending March, 1910.....	3,594,251		3,594,251	89,844 10
Ending March, 1911.....	4,126,728		4,126,728	103,163 19
Ending March, 1912.....	4,024,237		4,024,237	100,606 29
Ending March, 1913.....	5,018,412		5,018,412	125,460 52
Ending March, 1914.....	5,301,508		5,301,508	132,537 69
Ending March, 1915.....	4,649,634		4,649,634	116,241 04
Ending March, 1916.....	4,458,278		4,458,278	111,457 19
Ending March, 1917.....	3,960,207		3,960,207	99,007 92
Ending March, 1918.....	3,266,019		3,266,019	81,650 55
Ending March, 1919.....	1,947,082		1,947,082	48,677 07
Ending March, 1920.....	1,660,450		1,660,450	41,501 12
Ending March, 1921.....	1,246,486		1,246,486	31,273 76
Ending March, 1922.....	1,230,987		1,230,987	30,774 68
Total.....	130,728,098		123,060,170	4,809,094 77

*From the Report of the Mining Lands and Yukon Branch of the Department of the Interior, Fiscal Year ending March 31, by Controller H. H. Rowatt.

IRON ORE

Not including the 6,800 tons of bog iron ore produced by one operator in Quebec and used in the gas industry, and a small shipment of the same kind of ore shipped from British Columbia, the total shipments of iron ore in Canada during 1921 amounted to 59,509 tons, the net value of which was \$230,164. This was the lowest production during any of the last twenty years.

The production included 58,399 tons of roasted siderite, worth \$226,675; 78 tons of briquettes, valued at \$360, and 22 tons of hematite, valued at \$99, all of which came from Ontario mines. British Columbia shipped some 1,010 tons of magnetite worth \$3,030.

The ore exported amounted to 1,058.5 tons valued at \$3,272 of which 1,010 tons came from British Columbia and 48.5 tons from Ontario. There was no iron ore mined in Nova Scotia during the period. The Nova Scotia Steel and Coal Company and the Dominion Iron and Steel Company imported hematite ore from Bell Island, Conception Bay, on the coast of Newfoundland. There was 422,763 short tons mined and raised, of which 384,529 tons was shipped. This ore had a percentage of iron varying from 50 to 52 per cent and was valued at \$894,948. Shipments were as follows:—

	Tons.	Value.
To Europe.....	206,010	\$462,249
To Nova Scotia.....	178,519	\$432,699
Total.....	384,529	\$894,948

The European consignments were largely for Germany although considerable quantities went to Great Britain.

Summary of Iron and Steel Statistics, 1918-1921

TABLE 65

		1918	1919	1920	1921
Iron ore shipped from mines.....	Short tons	211,608	197,170	129,072	59,509
Canadian iron ore charged to blast furnaces..	"	96,745	78,391	149,515	126,653
Imported " " " " " "	"	2,146,995	1,674,194	1,957,738	1,141,007
Iron ore charged to steel furnaces.....	"	48,599	32,409	64,146	36,308
Pig-iron made in blast furnaces.....	"	1,163,520	910,080	1,081,561	664,993
" " " " electric furnaces.....	"	32,031	7,701	8,835	683
" " " " exported.....	"	2,130	63,605	102,628	2,685
" " " " imported.....	"	67,397	35,800	57,483	18,636
Ferro-alloys made.....	"	44,704	48,601	28,173	24,594
" " " " imported.....	"	35,284	4,384	7,908	2,295
" " " " exported.....	"	23,781	22,449	25,422	10,031
Pig-iron and ferro-alloy consumption.....	"	1,316,025	932,349	1,181,228	708,278
" " " " used in steel furnaces.....	"	897,537	609,670	732,486	465,750
Steel ingots and castings made.....	"	1,873,708	1,030,342	1,232,697	747,582
Steel rails made.....	"	162,747	316,304	255,322	298,110
Canadian coke used in iron blast furnaces....	"	561,135	372,203	415,742	244,830
Imported " " " " " "	"	861,522	689,548	788,795	590,199
Number of completed blast furnaces.....	No.	20	20	20	20
Number of men employed at blast furnaces..	"	1,391	1,259	1,179	617
Wages paid at blast furnaces.....	\$	1,941,500	2,017,880	2,186,779	922,276
Value of pig-iron produced.....	\$	33,495,171	24,577,589	29,939,676	15,518,582
" " " " iron and steel goods exported.....	\$	61,772,613	81,578,461	84,357,906	32,620,942
" " " " iron and steel goods imported.....	\$	178,340,779	178,210,710	249,632,055	127,470,117

PIG-IRON

The total production of pig-iron in Canada in 1921, excluding the production of ferro-alloys, was 665,676 tons, having a value of \$15,518,582, as compared with a total production in 1920 of 1,090,326 tons; valued at \$30,319,024, showing a decrease of 424,720 tons, or 39 per cent. Of the 1921 total, 664,993 tons was made in blast furnaces and 683 tons was made in electric furnaces from scrap metal, chiefly steel turnings. In 1920 the blast furnace production was 1,081,561 tons, and the electric furnace production from scrap steel was 8,835 tons.

The production of blast furnace pig-iron in Nova Scotia in 1921 was 169,504 tons, as against 332,493 tons in 1920. In Ontario the production of blast furnace pig-iron was 495,489 tons, as against 749,068 tons in 1920.

By grades the 1921 production included: Basic, 516,967 tons; foundry and malleable, etc., 148,026 tons; low phosphorus iron (electric furnace), 683 tons. By grades the 1920 production included: Basic, 740,598 tons; foundry and malleable, etc., 340,963 tons; low phosphorus iron (electric furnace), 8,835 tons.

The blast furnace plants operated included those of the Dominion Iron and Steel Company at Sydney, Nova Scotia; the Steel Company of Canada, at Hamilton, Ont.; the Canadian Furnace Company at Port Colborne, Ont.; the Algoma Steel Corporation, Limited, at Sault Ste. Marie, Ont., and the Midland Iron and Steel Co., at Midland, Ont.

Electric furnaces were operated for the production of pig iron and ferro-alloys at Montreal, Quebec; at Orillia, Hamilton, Niagara Falls and Welland, in Ontario.

The production of ferro-alloys in Canada in 1921 including ferro-silicon and spiegeleisen, was 24,594 tons valued at \$998,279. In 1920 the production was 28,173 tons valued at \$1,432,153.

The exports of pig-iron during 1921 were 2,685 tons, valued at \$70,686, or an average of \$26 per ton, and of ferro-alloys, 10,031 tons, valued at \$504,842, or an average of \$249 per ton.

The exports of pig-iron included 2,461 tons to the United States and 224 tons to the United Kingdom. The ferro-alloy exports included 8,522 tons to the United States, and 1,509 tons to other countries. Exports to the United States of foreign products comprised a total of 61 tons, including 38 tons of pig-iron, valued at \$1,483, and 23 tons of ferro-alloys, valued at \$2,752.

The imports into Canada during 1921 included 18,636 tons of pig-iron, valued at \$501,418, or an average of \$26 per ton, and 2,295 tons of ferro-alloys, valued at \$298,818, or an average of \$130 per ton, making a total import of pig-iron and ferro-alloys of 20,931 tons, valued at \$800,236. The United States trade records showed exports to Canada during 1921 of pig-iron and ferro-alloys amounting to 18,224 tons, valued at \$476,214.

STEEL

The total production of steel ingots and direct steel castings in 1921 was 747,582 tons, of which 722,484 tons were ingots and 25,098 tons direct steel castings.

The total production of steel in 1920 was 1,232,697 tons, of which 1,167,273 tons were ingots and 65,424 tons direct castings.

The 1921 production included: open-hearth steel, 726,777 tons; electric steel, 18,865 tons; crucible and converter steels, 1,940 tons.

The 1920 production included: open-hearth steel, 1,192,145 tons; electric steel, 28,301 tons; crucible and converter steels, 12,251 tons.

The total production of electric furnace steel in 1919 was 15,502 tons; in 1918, 119,130 tons, and in 1917, 50,467 tons.

The total production of pig iron, ferro-alloys, and steel in electric furnaces was 33,821 tons in 1921, as compared with 59,812 tons in 1920, 41,683 tons in 1919, and 19,869 tons in 1918.

The exports of steel from Canada during 1921 included: billets, blooms and ingots, 4,671 tons, valued at \$294,184, or an average of \$63 per ton; bars and rods, 10,563 tons, valued at \$678,032, or an average of \$64 per ton; steel rails, 16,665 tons, valued at \$706,252, or an average of \$42 per ton; wire valued at \$395,392; wire nails, 33,888 tons, valued at \$441,720 or an average of \$13 per ton; structural steel 2,258 tons, valued at \$301,224, or an average of \$133 per ton; scrap iron and steel, 46,872 tons, valued at \$723,979, or an average of \$15 per ton, together with a large quantity of manufactured iron and steel goods. The re-exports of foreign produce consisted of bars and rods, 169 tons, valued at \$25,765; steel rails, 272 tons, valued at \$8,378; wire valued at \$35,399; wire nails, 23 cwt., valued at \$295; structural steel, 136 tons, valued at \$6,813; scrap-iron and steel, 31 tons, valued at \$705.

The production of rolled iron and steel products in 1921, including blooms, billets and slabs rolled for forging purposes and blooms, billets and slabs of hammered charcoal iron was 792,474 tons. The total production of rolled products included: steel rails, 298,110 tons; plates and sheets, 18,159 tons; wire rods, 81,778 tons; merchant bars and structural shapes, 72,774 tons.

The total production in 1920 of finished rolled products was 1,061,614 tons, which included: steel rails, 255,322 tons; plates and sheets, 39,283 tons; wire rods, 216,882 tons; merchant bars and structural shapes, 423,855 tons; rolled blooms and billets for forging purposes and rolled blooms, billets or slabs sold for export, 86,989 tons.

Detailed statistics of the iron and steel industry in Canada are given in a special Bureau report entitled "*Iron and Steel and their Products.*"

LEAD

Production.—The production of lead in Canada in 1921 amounted to 66,679,592 pounds (33,339.8 tons), which at the average price of 5.742 cents per pound, was valued at \$3,828,742, as against 35,953,717 pounds (17,977 tons), valued at \$3,214,262, or an average price of 8.940 cents for 1920.

The production in 1921 included: (a) 62,333,281 pounds (31,166.6 tons) of lead bullion produced at Trail, B.C., and pig-lead produced at Galetta, Ont.; (b) 4,343,611 pounds (2,171.8 tons), the estimated recoveries from lead ores exported to the United States; and (c) 2,700 pounds, the estimated recoveries from gold and silver ores of Ontario, also exported to the United States.

The corresponding figures for 1920 were: (a) 28,985,509 pounds (14,492.7 tons); (b) 6,958,637 pounds (3,479.3 tons); (c) 9,490 pounds (4.7 tons).

The statistics of lead production since 1912 as given in the accompanying table represent the quantity of lead produced in Canada from domestic ores, together with the estimated lead recovery from lead ore or bullion exported. Previous to 1913 the figures reported are those published by the British Columbia Provincial Mineralogist, which show the metal content of the shipments and are somewhat in excess of the actual amount recovered.

The production was mainly from British Columbia, with small amounts from Ontario and Quebec.

The production of lead in British Columbia is derived from the zinc-lead ores of the East and West Kootenays. Detailed statistics covering the zinc-lead industry as a whole are given in Part Two of this report. During 1921 the smelter production from domestic ores amounted to 60,298,603 pounds valued at \$3,462,346, which included the lead contained in lead bullion recovered in the treatment of Canadian ores together with the estimated recoveries from lead ores exported. Compared with the record for the year 1920, in which the production amounted to 32,792,725 pounds valued at \$2,931,670, there was an increase of 83.3 per cent in quantity but only 18 per cent in value.

Previous to 1915 almost all the lead ores mined in British Columbia were smelted and refined at Trail, B.C. Since 1915 to the present date with the exception of 1917 considerable tonnages of lead ores and concentrates have been exported to the United States. In 1918 these exports amounted to over 27,000 tons of ores and concentrates, being mostly from the Sullivan mine at Kimberley, while in 1919 they were reported as being about 7,500 tons and in 1920 as being about 6,000 tons. During 1921 the exports of ore and concentrates dropped to 4,269 tons.

British Columbia is the main source of lead production in Canada.

Production of Lead from Canadian Ores, 1887-1921

TABLE 66

Year	Pounds	Value	Cents per pound†	Year	Pounds	Value	Cents per Pound†
		\$				\$	
1887.....	204,800	9,216	5.400	1905.....	56,864,915	2,676,632	4.707
1888.....	674,500	29,812	4.420	1906.....	54,608,217	3,089,187	5.657
1889.....	165,100	6,488	3.930	1907.....	47,738,703	2,542,086	5.325
1890.....	105,000	4,704	4.480	1908.....	43,195,733	1,814,221	4.200
1891.....	88,665	3,857	4.350	1909.....	45,857,424	1,692,139	3.690
1892.....	808,420	33,064	4.090	1910.....	32,987,508	1,216,249	3.687
1893.....	2,135,023	79,636	3.730	1911.....	23,784,969	827,717	3.480
1894.....	5,703,222	187,636	3.290	1912.....	35,763,476	1,597,554	4.467
1895.....	16,461,794	531,716	3.230	1913.....	37,662,703	1,754,705	4.659
1896.....	24,199,977	721,159	2.980	1914.....	36,337,765	1,627,568	4.479
1897.....	39,018,219	1,396,853	3.580	1915.....	46,316,450	2,593,721	5.600
1898.....	31,915,319	1,206,399	3.780	1916.....	41,497,615	3,532,692	8.513
1899.....	21,862,436	977,250	4.470	1917.....	32,576,281	3,628,020	11.137
1900.....	63,169,821	2,760,521	4.370	1918.....	51,398,002	4,754,315	9.250
1901.....	51,900,958	2,249,387	4.334	1919.....	43,827,699	3,053,037	6.966
1902.....	22,956,381	934,095	4.069	1920.....	35,953,717	3,214,262	8.940
1903.....	18,139,283	768,562	4.237	1921.....	66,679,592	3,828,742	5.742
1904.....	37,531,244	1,617,221	4.309				

†In 1909 and 1910, average prices at Toronto as quoted by *Hardware and Metal*; in previous years, average prices at New York, as quoted by *Engineering and Mining Journal*.

From 1911 to date, average price in Montreal. Quotations furnished from 1911 to 1919, by Messrs. Thos. Robertson & Co., Montreal, Que.; 1920 and 1921 by Consolidated Mining and Smelting Company, Montreal, Que.

For a number of years there has been a very wide divergence between the record of lead recovery and the statements of lead contained in ores shipped from the mines. While the difference has been due, in part, to smelter losses, there was also, during 1912 and 1913 especially, a considerable accumulation of lead ores at the Trail smelter, and again in 1916 the estimated possible recovery (on the basis of a 90 per cent recovery) from lead ores shipped from the mines exceeded by far the actual smelter production.

The total mine shipments in 1921 of silver-lead ores and concentrates amounted to 15,259 tons, valued by the operators at \$671,313, and said to contain 9,517,616 pounds of lead, as against 69,493 tons, valued at \$2,985,848, containing 36,325,507 pounds of lead in 1920. While the shipments of silver-lead ores and concentrates have greatly decreased, it may be pointed out that some 58,445,095 pounds of lead was contained in zinc-lead ores reported in the section on zinc as shipped from the Sullivan mine.

Shipments of Lead Ores from Canadian Mines, showing Metal Contents

TABLE 67

Year	Lead ores shipped		Lead Contents in Pounds	Silver Contents in Ounces
	Tons	Value		
		\$		
1912.....	59,814	2,544,942	45,896,537	2,366,294
1913.....	85,978	3,276,812	53,807,570	2,564,155
1914.....	70,207	2,652,802	50,527,130	2,501,820
1915.....	73,752	2,958,394	48,708,005	2,954,175
1916.....	84,516	4,568,500	54,124,628	2,582,952
1917.....	46,799	3,866,862	38,696,116	1,670,064
1918.....	75,256	4,705,573	46,843,602	2,314,542
1919.....	54,508	3,044,839	32,147,989	2,185,376
1920.....	69,493	2,985,848	36,325,507	2,882,178
1921.....	15,259	671,313	9,517,616	989,374

Previous to 1904 lead ores mined in Canada were either exported as ore or smelted in Canadian furnaces and exported in the form of base bullion for refining. A lead refinery employing the Betts electrolytic process has been in operation at Trail, B.C., since 1904, treating the base bullion produced by the lead blast furnaces.

The production of refined lead at Trail amounted in 1921 to 28,820 tons, as against 13,237 tons in 1920 and 16,446 tons in 1919.

The North American Smelting Company erected a plant at Kingston, Ont., which operated towards the end of 1912, treating scrap and lead dross, as well as ores from the United States, British Columbia and Ontario. This plant closed down in 1913, but operations were resumed in 1916 by a company known as the Kingston Smelter Company, Limited, under lease. After operating about four months the plant was finally closed.

The Kingdon Mining, Smelting and Manufacturing Company, Limited, which is now smelting ores from the Kingdon mine at Galetta, Ont., came into existence early in 1919, when the plant was operated by the Estate of James Robertson.

The production in Quebec, as in past years, was derived wholly from the deposits at Notre Dame des Anges.

Refined Lead Produced in Canada*, 1904-1921

TABLE 68

Year	Pounds of Refined Lead Produced	Year	Pounds of Refined Lead Produced	Year	Pounds of Refined Lead Produced
1904.....	7,519,440	1910.....	32,987,508	1916.....	33,087,474
1905.....	15,804,509	1911.....	23,525,050	1917.....	32,115,114
1906.....	20,471,314	1912.....	35,893,190	1918.....	31,571,112
1907.....	26,607,461	1913.....	37,923,043	1919.....	34,330,920
1908.....	36,549,274	1914.....	36,443,706	1920.....	28,720,030
1909.....	41,883,614	1915.....	43,518,618	1921.....	60,949,793

*The refined lead reported includes the lead bullion produced from Canadian and foreign ores and refined at Trail, B.C., with also the pig-lead from the Ontario smelters.

Exports of Lead from Canada, 1919, 1920 and 1921

TABLE 69

	1919		1920		1921	
	Pounds	Value	Pounds	Value	Pounds	Value
Lead in ore.....	13,142,900	\$ 616,278	7,549,400	\$ 385,839	6,253,700	\$ 256,834
Pig-lead.....	11,326,800	772,734	18,800	1,846	23,779,700	992,485
Total.....	24,469,700	1,389,012	7,568,200	387,685	30,033,400	1,249,319

Imports into Canada of Lead in Pigs, Bars, Sheets, etc., and Manufactures

TABLE 70

	1919			1920			1921		
	Pounds	Value	Cents per Pound	Pounds	Value	Cents per Pound	Pounds	Value	Cents per Pound
		\$			\$			\$	
Old and scrap, pig and block.....	10,405,197	532,272	5.11	27,002,717	2,206,200	8.17	1,781,230	87,228	4.89
Bars and sheets.....	573,994	35,097	6.11	768,726	67,872	8.83	236,696	15,411	6.55
Litharge.....	3,046,300	126,243	4.14	2,457,900	277,951	11.30	1,650,500	131,009	7.94
Acetate and nitrate of lead.....	152,592	20,034	13.1	152,584	21,491	14.08	171,561	18,471	10.77
Other manufactures.....		138,729			265,507			140,948	
Pipe lead.....	89,493	8,013	8.95	48,769	5,185	10.63	72,238	5,026	6.96
Shots and bullets.....	7,083	976	13.79	117,224	10,497	8.95	14,152	1,081	7.64
Tea lead.....	359,558	37,181	10.34	251,273	34,119	13.58	140,259	12,586	8.99
Lead pigments:—									
Dry white lead.....	158,582	13,186		34,520	3,003		16,027	1,533	
White lead, ground in oil.....	228,806	8,415		39,032	5,444		48,424	5,123	
Dry red lead and orange mineral.....	1,120,713	102,119		967,533	110,989		795,275	68,486	
Total imports.....	1,518,101	123,720	8.15	1,041,085	120,136	11.54	859,726	75,142	8.74

Prices.—The price of lead at Montreal, the main Canadian market, has been higher than the New York and London values for the past eight years. The average price of lead at Montreal in 1921 was 5.742 cents per pound as against 8.940 cents in 1920. The Toronto price in 1921 averaged 5.849 cents per pound, as against 9.041 cents in 1920, and the price in London per long ton was £22 6s. 7d. in 1921, as against £38 4s. 7d. in 1920.

Yearly Average Prices of Lead in Montreal, London, New York, and St. Louis

(Value in cents per pound)

TABLE 71

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
Montreal.....	4.467	4.659	4.479	5.600	8.513	11.137	9.250	6.966	8.940	5.742
London.....	3.921	4.072	4.146	4.979	6.715	6.626	6.539	6.216	8.219	4.951
New York.....	4.471	4.370	3.862	4.673	6.858	8.787	7.413	5.759	7.957	4.545
St. Louis.....	4.360	4.238	3.737	4.567	6.777	8.721	7.222	5.530	7.830	4.363

Monthly Average Prices of Pig-Lead at Montreal*

(Value in cents per pound)

TABLE 72

Month	1919	1920	1921
January.....	6.75	9.90	6.093
February.....	5.85	10.25	5.683
March.....	6.12	11.07	5.377
April.....	5.65	9.85	5.404
May.....	5.60	9.40	6.021
June.....	6.10	9.30	5.795
July.....	6.25	8.90	5.75
August.....	6.50	9.00	5.571
September.....	6.65	8.10	5.588
October.....	6.75	7.60	5.581
November.....	7.80	7.30	5.820
December.....	8.35	5.80	6.223
Average.....	6.531	8.873	5.742

*Producers' prices for car load quantities ex-cars Montreal, as furnished by Messrs. Thos. Robertson & Co., Limited, Montreal, 1912 to 1919 and by Consolidated Mining and Smelting Company, 1920 and 1921.

Monthly Average Prices of Lead in New York†

(Value in cents per pound)

TABLE 73

Month	1919	1920	1921
January.....	5-432	8-561	4-821
February.....	5-057	8-814	4-373
March.....	5-226	9-145	4-084
April.....	4-982	8-902	4-356
May.....	5-018	8-576	4-952
June.....	5-340	8-323	4-485
July.....	5-626	8-338	4-410
August.....	5-798	8-687	4-382
September.....	6-108	8-179	4-600
October.....	6-487	7-070	4-690
November.....	6-808	6-159	4-683
December.....	7-231	4-727	4-700
Average.....	5-759	7-957	4-545

†From the *Engineering and Mining Journal*.

Monthly Average Prices of Lead in London‡

(In £ Sterling per ton of 2,240 pounds)

TABLE 74

Month	1919			1920			1921		
	£	s	d	£	s	d	£	s	d
January.....	34	10	0	47	7	2	23	13	3
February.....	26	13	0	50	12	9	20	8	9
March.....	26	16	11	47	1	10	18	20	11
April.....	24	8	7	40	4	0	20	17	6
May.....	23	18	6	39	3	2	23	0	0
June.....	22	12	2	35	1	4	22	7	2
July.....	23	14	2	35	9	0	23	6	5
August.....	25	1	7	36	8	10	23	6	6
September.....	25	12	7	35	7	6	22	19	0
October.....	28	15	11	35	2	2	23	12	2
November.....	34	16	1	32	5	6	24	4	2
December.....	41	7	8	24	11	10	24	16	9
Yearly average.....	28	3	11	38	4	7	22	6	7

‡As published by the Metal Information Bureau, London.

Bounties.—The Lead Bounty Act of 1913 expired in June, 1918, and was not re-enacted. The text of this Act and the regulations under which the Act was administered were quoted in the Annual Report on Mineral production for 1914 and previous years.

Statement of Bounties Paid on Lead during the Fiscal Years 1899 to 1921

TABLE 75

Year ending	Bounty paid	Year ending	Bounty paid	Year ending	Bounty paid
	\$		\$		\$
June 30, 1899.....	76,665	June 30, 1906.....	90,196	March 31, 1914.....	8,179
June 30, 1900.....	43,335	March 31, 1907.....	1,995	March 31, 1915.....	3,217
June 30, 1901.....	30,000	March 31, 1908.....	51,001	March 31, 1916.....	59
June 30, 1902.....		March 31, 1909.....	307,433	March 31, 1917.....	
June 30, 1903.....	4,380	March 31, 1910.....	340,542	March 31, 1918.....	
June 30, 1904.....	195,627	March 31, 1911.....	248,534	March 31, 1919.....	
June 30, 1905.....	330,645	March 31, 1912.....	179,288	March 31, 1920.....	
		March 31, 1913.....	68,065	March 31, 1921.....	

Production of Lead from Quebec Ores, 1915-1921

TABLE 76

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1915.....	40,401	2,262	1918.....	2,110,059	195,180
1916.....	698,760	59,485	1919.....	2,280,000	158,825
1917.....	1,378,001	153,468	1920.....	905,472	80,949
			1921.....	595,881	34,215

Production of Lead from Ontario Ores, 1913-1921

TABLE 77

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1913.....	33,000	1,537	1917.....	1,586,711	176,712
1914.....		29,813	1918.....	1,084,366	155,804
1915.....	88,985	4,983	1919.....	1,487,586	103,625
1916.....	685,932	58,393	1920.....	2,255,520	201,643
			1921.....	3,312,493	190,203

Production of Lead from British Columbia Ores, 1887-1921

TABLE 78

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1887.....	204,800	9,213	1905.....	56,580,703	2,663,254
1888.....	674,500	29,813	1906.....	52,408,217	2,964,733
1889.....	165,100	6,488	1907.....	47,738,703	2,542,086
1890.....			1908.....	43,195,733	1,814,221
1891.....			1909.....	45,857,424	1,692,139
1892.....	808,420	33,064	1910.....	32,987,508	1,216,249
1893.....	2,131,092	79,490	1911.....	23,784,969	827,717
1894.....	5,703,222	187,636	1912.....	35,763,476	1,597,554
1895.....	16,461,794	531,716	1913.....	37,626,899	1,753,037
1896.....	24,199,977	721,159	1914.....	36,289,845	1,625,422
1897.....	38,841,135	1,390,513	1915.....	45,377,064	2,541,116
1898.....	31,693,559	1,198,017	1916.....	39,157,701	3,333,496
1899.....	21,862,436	977,250	1917.....	29,483,725	3,283,602
1900.....	62,158,621	2,760,031	1918.....	47,594,328	4,402,475
1901.....	51,582,906	2,235,603	1919.....	40,060,113	2,790,587
1902.....	22,536,381	917,005	1920.....	32,792,725	2,931,670
1903.....	18,089,283	766,443	1921.....	60,298,603	3,462,346
1904.....	36,646,244	1,579,086			

The record given in the preceding table represents the recovery of lead from domestic ores at the smelter or refinery as distinguished from the figures given in the table next succeeding, which indicate the quantities of lead contained in ore sent to smelters.

Production of Lead in British Columbia by Districts*

(Lead contained in ore shipped from mines, in pounds)

TABLE 79

District	1919	1920	1921
Cassiar—			
Atlin, etc.....			
Skeena, etc.....			
East Kootenay—			
Fort Steele.....	10,729,483	26,926,319	38,066,820
Windermere, etc.....	1,659,279	1,095,486	385,000
West Kootenay—			
Ainsworth.....	4,336,602	4,072,807	1,264,845
Nelson.....	292,010	719,219	1,301
Slocan.....	12,156,845	6,135,581	1,614,425
Revelstoke, etc.....	44,035	83,165	13,699
Yale—			
Yale—Kamloops.....	29,485		
Similkameen, etc.....	4,594	2,720	
Grand Forks, etc.....	43,200	106,433	51,268
Cariboo—			
Omineca.....	180,455	189,488	4,930
	29,475,968	39,331,218	41,402,288

* From the Report of the Minister of Mines, B.C.

MERCURY

There has been no production of mercury recorded since 1897. The small production reported in 1895, 1896, and 1897, was derived from the deposits at the western end of Kamloops Lake, B.C. These deposits consist of quartz veins containing pockets of cinnabar, in a zone of decomposed tertiary volcanic rocks.

Mercury has also been reported as occurring in ores of the Cobalt district, and in the neighbourhood of Field, B.C., and Sechart, on the west coast of Vancouver Island.

The Kerr Lake Mines, Limited, of Cobalt, Ont., in its annual report to the shareholders, reported recoveries of mercury amounting to 545.5 pounds in 1918, and 137.5 pounds in 1919.

Large quantities of mercury have been used during the war in the manufacture of munitions, for detonators and explosives, and since the British Empire is entirely dependent on foreign sources for supplies of this metal, it was considered advisable to make an investigation of the deposits at Copper Creek, on the north side of Kamloops Lake, B.C., as a locality from which a supply might be obtained if other sources were cut off. An examination was made in July, 1918, by Mr. Chas. Camsell, of the Geological Survey Branch, Department of Mines, Ottawa. His report appeared in the Summary of the Geological Survey for 1918 (part B., pp. 17-22).

The imports of mercury during 1921 were 30,894 pounds, valued at \$20,570, as against 209,020 pounds, valued at \$272,152, in 1920.

Production of Mercury in Canada, 1895-1921

TABLE 80

Calendar Year	Flasks*	Price per flask	Value
1895.....	71	\$ 33.00	\$ 2,343
1896.....	58	33.44	1,940
1897.....	9	36.00	324
1898-1921.....			

*Seventy-six and one-half (76½) pounds each.

Imports into Canada of Mercury, 1907-1921

TABLE 81

Calendar Year	Pounds	Value	Calendar Year	Pounds	Value
		\$			\$
1907.....	189,841	82,873	1915.....	184,432	159,184
1908.....	87,620	44,020	1916.....	79,204	74,461
1909.....	285,958	147,625	1917.....	71,608	76,322
1910.....	107,888	63,450	1918.....	56,936	68,903
1911.....	118,336	67,416	1919.....	26,465	31,573
1912.....	137,474	72,171	1920.....	209,020	272,152
1913.....	219,442	109,493	1921.....	30,894	20,570
1914.....	204,229	97,449			

Average Monthly Price of Mercury

(Per flask of 75 pounds)

TABLE 82

Month	1919		1920		1921	
	New York	San Francisco	New York	San Francisco	New York	San Francisco
	\$	\$	\$	\$	\$	\$
January.....	105.50	103.07	90.192	48.440	48.440	48.440
February.....	89.84	91.45	84.432	49.545	49.545	49.545
March.....	71.56	73.68	92.611	46.796	46.796	46.796
April.....	72.94	71.20	102.192	45.423	45.423	45.423
May.....	83.12	78.60	89.560	47.000	47.000	47.000
June.....	93.25	89.83	90.154	46.846	46.846	46.846
July.....	104.68	98.85	90.333	44.950	44.950	44.950
August.....	107.08	103.73	83.806	45.028	45.028	45.028
September.....	102.52	99.83	75.000	42.660	42.660	42.660
October.....	86.35	86.23	67.200	39.840	39.840	39.840
November.....	90.74	82.28	58.417	39.804	39.804	39.804
December.....	98.27	91.13	49.577	49.212	49.212	49.212
Year.....	92.15	89.16	81.123	45.462	45.462	45.462

MOLYBDENUM

There was no production of molybdenite in Canada during 1920 and 1921.

The total production in 1919 representing the quantity of MoS₂ contents of the concentrates produced, for which payment was made, amounted to 83,002 pounds, valued at \$69,203, or an average of about 83.4 cents per pound. The total production in 1918 representing the MoS₂ contents of the concentrates produced for which payment was made, amounted to 378,029 pounds which at \$1.15 per pound would have a total value of \$434,733.

In 1919, the total shipments of concentrates as stated by the producers were 46.0 tons, valued at \$69,203, while 6,783 tons of ore was treated at the concentration plants. In 1918 the total shipments of ore and concentrates were 461.4 tons valued at \$428,807, and 33,935 tons of ore was treated at the concentrating plants.

Production of Molybdenite in Canada, 1902-1921

TABLE 83

Calendar Year	Ores mined	Ores treated	Ores and concentrates shipped		MoS ₂ Contents of shipments	MoS ₂ production (probable recovery)	
	Tons	Tons	Tons	Value (a)	Pounds	Pounds	Value (b)
1902.....	3	.....	3.3	\$ 400	(c)	(c)	(c)
1903.....	600	.....	85.0	1,275	(c)	(c)	(c)
1904-1913.....	.....	.....	.....	.....	.....	.....	.....
1914.....	166	.....	16.5	2,063	3,814	3,814	\$ 2,063
1915.....	2,242	216	39.0	28,920	29,210	29,210	28,450
1916.....	13,522	9,106	610.0	188,316	156,461	156,461	156,461
1917.....	26,871	22,605	1,554.3	320,006	330,316	288,705	288,705
1918.....	34,030	33,935	461.3	428,807	378,482	378,029	434,733
1919.....	7,280	6,783	46.0	69,203	83,002	83,002	69,203
1920-1921.....	.....	.....	.....	.....	.....	.....	.....

(a) Value as given by the operators.

(b) Estimated at the average market value of molybdenite.

(c) No figures available.

The war stimulated the demand for molybdenum ores to a considerable extent, but with the cessation of hostilities, the producers were left with considerable stocks on hand which could not very readily be absorbed in peace times with the limited uses for the metal, apart from the making of ferro-molybdenum. The price declined accordingly to as low as 40 to 50 cents per pound for forced sales.

A few companies carried on development work during 1919 and 1920 but the only producer in 1919 was the Dominion Molybdenite Company, Limited, operating the property at Quyon, Que. for part of the year only.

The ore produced has been chiefly low grade material carrying less than 2 per cent MoS₂ but included small quantities of ore running from 2 to 15 per cent MoS₂ and some higher grade hand picked material.

All the ore produced in Canada has been concentrated in Canadian mills erected for the purpose, and marketed either as concentrates, molybdic acid, ammonium molybdate, or as ferro-molybdenum for the manufacture of which two electric furnace plants were established and operated during 1916, 1917, and 1918.

There has been no production of ferro-molybdenum since February, 1918.

There are molybdenite deposits in Nova Scotia, Quebec, Ontario, Manitoba, and British Columbia. The principal production has come from the Quyon mine, in Pontiac county, Quebec.

During the last few years, reports have been published on several of the Canadian molybdenite deposits.¹

Prices.—The market quotations in January, 1921, for molybdenum ore, 85 per cent MoS₂, were 45 to 50 cents per pound of contained sulphide and were purely nominal, practically no sales being reported.

¹(a) "Report on the Geology and Mineral Resources of the Keekeep and Kewagama Lakes Region, Quebec." By J. A. Bancroft, Report of Bureau of Mines, Quebec, 1911.

(b) "Report of the Molybdenite Deposits of the Moss mine, Quyon, Que." By Chas. Camsell. Summary Report, Geol. Survey, 1916.

(c) "Report on the Arnprior-Quyon district, Ontario and Quebec." By M. E. Wilson. Summary Report of the Geol. Survey, 1917, Part E.

(d) "Report on the Deposits of Ontario." By A. L. Parsons. *Can. Min. Journal*, June 1, 1917.

(e) "Report on the Molybdenite Deposits at Falcon Lake, Eastern Manitoba." By J. S. Delury. *Can. Mining Journal*, December 1, 1917.

(f) "Report on the Index Molybdenite Mine, Lillooet, B.C." By Dr. C. W. Drysdale. Summary Report of the Geol. Survey, 1916.

NICKEL

The production of nickel in 1921 was the lowest recorded since the year 1908, and amounted to only 19,293,060 pounds (9,646.5 tons), valued at \$6,752,571, as against 61,335,706 pounds (30,667.9 tons), valued at \$24,534,282, in 1920, or a decrease of 68 per cent.

This production included: (a) the nickel in the matte produced from the treatment of the nickel-copper ores of the Sudbury district, part of which matte was exported for refining; (b) the metallic nickel and the estimated nickel contents of the nickel oxides and nickel salts produced in the silver smelters of southern Ontario.

Production of Nickel in Canada, 1889-1921

TABLE 84

Calendar Year	Pounds of nickel	Cents per pound	Value	Calendar Year	Pounds of nickel	Cents per pound	Value
			\$				\$
1889.....	830,477	60	498,286	1906.....	21,490,955	42	8,948,834
1890.....	1,435,742	65	933,232	1907.....	21,189,793	45	9,535,407
1891.....	4,035,347	60	2,421,208	1908.....	19,143,111	43	8,231,538
1892.....	2,413,717	58	1,399,956	1909.....	26,282,991	36	9,461,877
1893.....	3,982,982	52	2,071,151	1910.....	37,271,033	30	11,181,310
1894.....	4,907,430	38½	1,870,958	1911.....	34,098,744	30	10,229,623
1895.....	3,888,525	35	1,360,984	1912.....	44,841,542	30	13,452,463
1896.....	3,397,113	35	1,188,990	1913.....	49,676,772	30	14,903,032
1897.....	3,997,647	35	1,399,176	1914.....	45,517,937	30	13,655,381
1898.....	5,517,690	33	1,820,838	1915.....	68,308,657	30	20,492,597
1899.....	5,744,000	36	2,067,840	1916.....	82,958,564	35	29,035,497
1900.....	7,080,227	47	3,327,707	1917.....	84,330,280	40	33,732,112
1901.....	9,189,047	50	4,594,523	1918.....	92,507,293	40	37,002,917
1902.....	10,693,410	47	5,025,903	1919.....	44,544,883	40	17,817,953
1903.....	12,505,510	40	5,002,204	1920.....	61,335,706	40	24,534,282
1904.....	10,547,883	40	4,219,153	1921.....	19,293,060	35	6,752,571
1905.....	18,876,315	40	7,550,526				

In 1921 a total of 257,154 tons of nickel-copper ore was mined and 393,768 tons was smelted from which there was produced 19,497 tons of Bessemer matte carrying approximately 9,628.4 tons of nickel and 6,322.6 tons of copper. The average metal recovery in the matte from the ores treated was 2.44 per cent nickel and 1.60 per cent copper.

In 1920 the nickel-copper ore mined amounted to 1,135,792 tons, and smelted 1,086,159 tons, from which was produced 57,938 tons of Bessemer matte carrying approximately 30,557 tons of nickel and 16,000 tons of copper. The average metal recovery in matte from the ores treated was 2.69 per cent nickel and 1.41 per cent copper.

Production of the Sudbury District

TABLE 85

	1917	1918	1919	1920	1921
Ore mined..... Short tons	1,518,783	1,641,617	572,400	1,135,792	257,154
Ore smelted..... "	1,453,661	1,559,892	754,567	1,086,159	393,768
Bessemer matte produced.....	78,897	87,184	42,736	57,938	19,497
Copper content of matte.....	21,196	23,482	12,099	16,000	6,323
Nickel content of matte.....	41,887	45,886	22,035	30,557	9,628

The nickel-copper ore is reduced in smelters and converters to a Bessemer matte containing from 77 to 81 per cent of combined metal; in 1921 it averaged

49.4 per cent nickel and 32.4 per cent copper. The percentages of metal since the year 1912 are shown in the following table:—

Proportion of Nickel and Copper in Sudbury Matte

TABLE 86

Year	Percentage		
	Nickel	Copper	Total
1912.....	53.5	26.3	79.8
1913.....	52.7	27.4	80.1
1914.....	49.0	31.1	80.1
1915.....	50.3	29.0	79.3
1916.....	51.6	28.0	79.6
1917.....	50.6	26.9	77.5
1918.....	52.6	26.0	78.6
1919.....	51.6	28.3	79.9
1920.....	52.7	27.6	80.3
1921.....	49.4	32.4	81.8

Monel metal is also produced directly from nickel-copper mattes, and contains about 22 per cent copper and 28 per cent nickel. The ability to resist the corrosive action of acid and other solutions which readily attack steel has given this metal an importance in many lines of manufacturing. No production of monel metal was reported in 1921.

The past few years have witnessed great development in the nickel-copper industry, which has been the subject of many special reports by different departments and commissions ⁽¹⁾

Statistics covering the operations of mining, smelting and refining are shown in a special chapter in this report.

The production from the refineries at Port Colborne, Ontario, and Deschenes, Quebec, and from the eastern Ontario smelters in 1921 was (a) metallic nickel, 5,430,147 pounds (2,715 tons), valued at \$1,825,359; (b) nickel oxides, 7,825,069 pounds, valued at \$1,585,896; and (c) nickel sulphate and nickel castings, 17,661 pounds, valued at \$6,100.

The corresponding figures for the year 1920 were (a) 10,962,792 pounds (5,481.4 tons), valued at \$3,836,782, (b) 4,889,571 pounds, valued at \$1,151,164, and (c) 33,836 pounds, valued at \$10,116.

The new refinery erected at Port Colborne, Ont., by the International Nickel Company of Canada, Limited, started operations in July, 1918, and this company has the distinction of being the first to produce refined nickel in Canada from the Sudbury ores.

The British America Nickel Corporation, Limited, completed in 1919 the construction of the smelter at Nickelton near Sudbury and the refinery at Deschenes. The smelter commenced operations early in 1920 and the refinery shortly afterwards. This latter plant produced refined nickel and copper and also recovered the precious metals platinum, palladium, iridium and gold from the treatment of residues.

The Port Colborne and Deschenes plants, and the smelters supplying them ceased operations about the middle of 1921 on account of poor markets for nickel.

The total estimated nickel contents of the compounds recovered by the Ontario silver smelters in smelting silver-cobalt ores in 1921 was 36,160 pounds, as against 221,150 pounds in 1920 and 474,274 pounds in 1919.

¹ "Report on Nickel and Copper Deposits of Sudbury, Ont." By A. E. Barlow, Geol. Survey, Canada No. 873, 1901.

"The Sudbury Nickel Region," By A. P. Coleman, Ph.D., Ontario Bureau of Mines, Vol. XIV, Part III, 1904.

"The Nickel Industry with Special Reference to the Sudbury Region, Ontario." Report by A. P. Coleman, Ph.D., Mines Branch, Ottawa, No. 170, 1913.

"Report of the Royal Ontario Nickel Commission with Appendix, Toronto, 1917."

Production from the Silver-Cobalt-Nickel Smelters of Eastern Ontario

TABLE 87

Year	Metallic Nickel		Nickel-Oxides		Nickel contents of recoveries
	Pounds	Value	Pounds	Value	
		\$			
1912.....			* 91,377	9,137	†
1913.....			*268,304	30,122	†
1914.....			*392,512	34,883	†
1915.....	55,325	22,130	†282,025	31,262	231,634
1916.....	79,360	31,538	†555,868	101,358	361,702
1917.....	265,896	108,334	†657,549	122,963	556,961
1918.....	243,186	88,720	†962,309	215,277	736,005
1919.....	397,884	137,435	†340,389	32,862	474,274
1920.....	204,537	71,287	†24,112	6,312	221,150
1921.....	10,973	3,442	12,396	3,830	36,160

*Does not include the mixed oxides of cobalt and nickel. See chapter on 'Cobalt' for values.

†Nickel-sulphate included with nickel oxides.

‡Figures not available.

Prices.—The average price of electrolytic nickel in New York during 1921 according to quotations published by the *Engineering and Mining Journal-Press* was 44 cents per pound for ingots and 41 cents for shot. Quotations were merely nominal owing to the depressed state of the market.

Exports from Canada of Nickel in Ore and Matte and as Metallic Nickel, 1912-1921

TABLE 88

Calendar Year	Pounds	Value	Cents per pound
		\$	
1912.....	44,221,830	4,661,758	10.54
1913.....	49,459,017	5,195,560	10.50
1914.....	46,528,327	5,149,427	11.07
1915.....	66,410,442	7,394,446	11.13
1916.....	80,441,700	8,662,179	10.77
1917.....	81,272,400	8,708,650	10.72
1918.....	87,478,500	11,263,246	12.88
1919.....	41,016,400	8,077,593	19.69
1920.....	60,199,300	11,988,857	19.92
1921.....	12,859,100	3,102,944	24.13

Imports into Canada of Nickel, 1912-1921

TABLE 89

Year	Nickel, nickel-silver, German silver, ingots and blocks		Nickel, nickel-silver, German silver, bars, rods, strips, sheets and plates		Mfrs. of German, Nevada and nickel-silver not plated	Nickel-plated ware n.o.p.
	Pounds	Value	Pounds	Value	Value	Value
		\$		\$	\$	\$
1912.....	48,245	17,957	619,523	154,387	85,069	1,311,362
1913.....	42,726	14,705	559,765	147,815	86,672	1,536,397
1914.....	70,564	25,362	549,288	130,065	83,185	986,492
1915.....	74,381	27,361	635,963	169,807	77,538	689,577
1916.....	179,367	66,515	715,072	258,811	89,084	1,097,903
1917.....	303,853	123,976	549,992	245,370	149,718	1,290,220
1918.....	95,306	39,295	542,958	199,600	204,208	1,082,787
1919.....	76,578	29,962	323,411	105,977	343,063	1,455,627
1920.....	7,197	3,260	(a) 728,466	253,299	570,984	2,000,767
1921.....	770	421	330,420	125,874	262,250	1,279,501

In view of the large exports of nickel from Canada to the United States and its refinement in that country a record of the imports into, and the exports of nickel from the United States may be of special interest, and is shown below as compiled from the "Foreign Commerce of the United States."

United States: Imports and Exports of Nickel,* 1920 and 1921

TABLE 90

	1920			1921		
	Quantity	Value	Cents per pound	Quantity	Value	Cents per pound
		\$			\$	
<i>Imports into United States:—</i>						
Ore and matte..... Gross tons.	32,650			1,507		
Nickel content..... Pounds	41,586,108	8,463,872	20.35	2,042,178	432,786	21.19
<i>Exports of nickel, nickel oxide and matte from United States to:—</i>						
Belgium (a)..... Pounds.	594,976	279,365	46.95			
France..... "	72,912	36,895	50.60			
Italy..... "						
Netherlands..... "						
United Kingdom..... "	69,622	30,501	43.81			
Japan..... "	352,834	164,781	46.70	103,484	45,134	
Other Countries..... "	124,888	63,303	50.69	322,367	58,238	
	1,215,232	574,845	47.30	425,851	103,372	24.27

*From the "Foreign Commerce of United States."

Imports of Nickel Ore and Matte into the United States*

TABLE 91

From	1919		1920		1921	
	Ore and Matte	Nickel content	Ore and Matte	Nickel content	Ore and Matte	Nickel content
	Tons	Pounds	Tons	Pounds	Tons	Pounds
Belgium.....			703	857,381	100	174,899
France.....						
Norway.....						
Canada (a).....	20,321	25,503,767	29,627	37,737,459	1,407	1,867,279
Oceania—						
French.....	50	83,168	1,240	1,595,267		
Australia.....	2,686	3,716,293	1,080	1,396,001		
Peru.....						
Chile.....						
New Zealand.....						
Totals.....	23,057	29,303,228	32,650	41,586,108	1,507	2,042,178

* From Reports on the commerce and navigation of the United States, Department of Commerce, Washington, D.C.

(a) Values were: in 1919, \$4,997,650; in 1920, \$7,723,278; and in 1921, \$390,098.

Exports of Nickel, Nickel-Oxide, and Matte from the United States*

(Nickel Content In Pounds)

TABLE 92

To	1919	1920	1921
Belgium.....	442,680	594,976	
Denmark.....			
France.....	1,346,119	72,912	
Germany.....		5,600	
Italy.....	525,940		
Netherlands.....	57,091		
Norway.....	10,056		
Portugal.....			
Russia in Europe.....			
Spain.....	12,971		
Sweden.....	12,769	908	
Switzerland.....		89,169	
United Kingdom—			
England.....	736,033	69,622	75
Scotland.....	11,404		
North America—			
Canada.....	35,972	1,145	1,023
Cuba.....	794		†112
Mexico.....	80	110	
Panama.....	37		
West Indies (Dutch).....			
Haiti.....			
South America—			
Argentina.....	4,467	236	
Brazil.....	1,327	10,064	
Chile.....	134	1,219	
Colombia.....	500		
Venezuela.....			
Asia—			
China.....	20,780	547	
German China.....			
British India.....			
Dutch East Indies.....			
Hong Kong.....	2,740		
Japan.....	582,946	352,834	103,484
Russia in Asia.....			
Oceania—			
British Australia and Tasmania.....	281		‡321,157
New Zealand.....		15,890	
Philippine Islands.....	20		
Egypt.....			
Switzerland.....	4,149		
Nicaragua.....	166		
Dominican Republic.....	1,000		
Ecuador.....	200		
Total.....	3,810,656	1,215,232	425,851

*From Reports on the commerce and navigation of the United States, Department of Commerce Washington, D.C.

†Costa Rica.

‡French Oceania.

Bounty on Refined Nickel and Nickel-oxide.—Under the terms of "The Metal Refining Act, 1907," of the province of Ontario (7 Edward VII, chapter XIV), a bounty was authorized to be paid on nickel, cobalt, copper, and arsenic under certain conditions and restrictions during a period of five years following the passing of the Act (April, 1907). In March, 1912, the Act was amended to cover a further period of five years. The Act expired in April, 1917, and was not re-enacted.

PLATINUM AND PALLADIUM

Platinum in Canada is found in the alluvial sands of British Columbia, principally in the Similkameen district, and it also occurs in the nickel-copper ores of the Sudbury district, associated with palladium, iridium, gold, silver, and other metals of the platinum group.

The recorded production in 1921 from the alluvial sands was 23 crude ounces, valued at \$1,585, as against 17 crude ounces, valued at \$719, in 1920, and 25 ounces, valued at \$2,150, in 1919.

Undoubtedly, the most important sources of the metals of the platinum group in Canada are the nickel-copper ores, but due to the fact that these precious metals occur in very small quantities per ton of ore and also to the fact that the processes necessitated are difficult to carry on, no attempt was made to recover these metals in Canada, previous to 1919.

The International Nickel Company of Canada reported a production at its Port Colborne refinery of precious metals cement containing 142.7 ounces of platinum, 309.6 ounces of palladium and 45.7 ounces of rhodium, osmium, etc., together with some gold and silver.

The British America Nickel Corporation in 1921 recovered in its refinery at Deschênes, Quebec, 125.84 fine ounces of platinum; 280.85 fine ounces of palladium; and 10.33 fine ounces of iridium. Small quantities of gold and silver were also recovered. This was the first production of these metals reported by this company.

For many years past there has been a more or less regular recovery at the New Jersey plant of the International Nickel Company of metals of the platinum group from the residues obtained in the refining of the Sudbury nickel-copper mattes; but as residues from other sources were treated with those from the Canadian ores, the total recovery could not be regarded as of Canadian origin; nevertheless, it is believed that the Sudbury mattes have been the source of by far the greater part of the platinum group metals recovered.

Summary of Platinum Statistics, 1919, 1920 and 1921

TABLE 93

		1919	1920	1921
Platinum production from alluvial sands.....	{ Ozs. 25		17	23
	{ Value. \$2,150		\$719	\$1,585
Platinum recovered at the Ottawa Royal Mint.....	{ Ozs. 23		15	19
	{ Value. \$1,990		\$775	\$942
Platinum metals recovered from the treatment of Sudbury mattes:—				
Platinum.....	{ Ozs. 25		89	269
	{ Value. \$1,447		\$5,665	\$21,014
Palladium.....	{ Ozs. 62		174	590
	{ Value. \$3,534		\$11,096	\$26,613
Rhodium, etc.....	{ Ozs.		20	56
	{ Value.		\$1,249	\$3,433
Imports of platinum as crucibles, wire, bars, etc.....	{ Value. \$160,885		\$125,977	\$94,551
Exports of platinum in concentrates and "old and scrap"....	{ Ozs. 671		790	1,180
	{ Value. \$62,629		\$85,740	\$82,311

The Mond Nickel Company did not furnish figures as to the precious metal contents of its matte in 1921, but from assays made on behalf of the Royal Ontario Nickel Commission on samples obtained from that company some years ago, it would appear that the matte produced by the Mond Nickel Company is considerably richer in metals of the platinum group than that from the Canadian Copper Company.

There was also a small production of platinum and associated metals from the residues obtained in the refinery of the Royal Mint, Ottawa. The recovery at the Royal Mint, Ottawa, in 1921 was 18.843 ounces of crude platinum, valued at \$942.15. In 1920 the recovery was platinum, 14.6 ounces, valued at \$775.07. The recovery in 1919 was: platinum, 23.3 ounces, valued at \$1,990.12; and iridium, 20.8 ounces, valued at \$2,268.12. The above figure 18.843 was not included in the record of production for Canada, owing to the fact that the platinum recovered at the Royal Mint was derived only in part from the treatment of Canadian gold bullion while the iridium was obtained from the imported South African gold bullion. Some was also recovered in the melting of old jewellery and scrap.

Production of Platinum in Canada from Alluvial Sands, 1887-1921

TABLE 94

Year	Value	Year	Value	Year	Crude Ounces	Value
	\$		\$			\$
1887.....	5,600	1897.....	1,600	1907-1912.....		
1888.....	6,000	1898.....	1,500	1913.....	18	489
1889.....	3,500	1899.....	825	1914.....		
1890.....	4,500	1900.....		1915.....	23	1,063
1891.....	10,000	1901.....	457	1916.....	15	600
1892.....	3,500	1902.....	190	1917.....	57	3,823
1893.....	1,800	1903.....		1918.....	39	2,560
1894.....	950	1904.....	420	1919.....	25	2,150
1895.....	3,800	1905.....	500	1920.....	17	719
1896.....	750	1906.....		1921.....	23	1,585

Recovery at the International Nickel Company's Works—New Jersey, U.S.A.

TABLE 95

Year	Matte treated	Gold	Silver	Platinum	Palladium	Rhodium	Others
	Tons	Ounces	Ounces	Ounces	Ounces	Ounces	Ounces
1907.....	17·840	993·572	63,400·70	226·800	607·300	(a)	.....
1908.....	18·839	5,238·181	139,329·29	172·316	328·287	(a)	.....
1909.....	18·407	2,113·669	63,138·66	546·627	1,270·598	(a)	.....
1910.....	24·309	2,649·799	60,256·83	258·325	522·804	(a)	.....
1911.....	26·840	2,203·052	70,954·38	655·552	753·363	(a)	.....
1912.....	27·653	2,476·558	62,169·66	496·850	680·130	(a)	.....
1913.....	38·733	2,336·405	77,924·03	192·863	207·713	191·067	.....
1914.....	40·267	2,695·957	75,928·18	748·440	756·360	515·801	.....
1915.....	31·428	3,444·785	101,793·17	452·430	543·240	57·475	.....
1916.....	56·405	3,495·123	110,285·21	1,016·581	1,344·915	257·070	.....
1917.....	59·209	1,954·934	92,963·67	970·695	1,354·459	325·407	.....
1918.....	62·250	1,968·703	107,076·78	649·737	786·654	472·579	.....
1919.....	19·528	634·043	35,689·79	616·716	762·217	227·294	(b) 76·613
1920.....	30·740	613·338	81,882·78	488·901	739·158	390·336	(b) 102·363
1921.....	2,217·000	6·901	1,242·74	281·582	382·626	256·110	(b) 10·655

(a) Figures not given separately.

(b) Includes Osmium, Iridium and Ruthenium.

Recovery of Platinum Black, Iridium Precipitate, and Palladium at the Royal Mint, Ottawa, for the calendar years 1919, 1920 and 1921

TABLE 96

Calendar Years	Platinum		Iridium		Palladium	
	Ozs. gross	Value	Ozs. gross	Value	Ozs. gross	Value
1919.....	29·281	\$ 2,711·59	20·782	\$ 2,268·12	0·696	\$ 87·00
1920.....	7·220	\$ 400·56	.....	.....	.....	.....
1921.....	18·843	\$ 1,160·73	.....	.....	.....	.....

Imports into Canada and Exports of Platinum, 1919, 1920, and 1921

TABLE 97

Item	1919		1920		1921	
	Ounces	Value	Ounces	Value	Ounces	Value
<i>Exports—</i>		\$		\$		\$
Ores and concentrates.....	325	28,815	473	53,956	876	63,380
Old and scrap.....	346	33,814	317	31,784	304	18,931
Total exports.....	671	62,629	790	85,740	1,180	82,311
<i>Imports—</i>						
Crucibles.....		15,642		13,772		6,198
Wire and bars, strips, sheets or plates.....		144,989		105,718		84,011
Retorts, pans, condensers, etc.....		254		6,487		4,342
Total imports.....		160,885		125,977		94,551

Average Yearly Prices of Platinum*

TABLE 98

(In dollars per fine ounce.)

Month	1919	1920	1921
	\$	\$	\$
January.....	104.85	154.23	73.400
February.....	100.43	151.59	70.227
March.....	99.20	138.56	72.463
April.....	99.85	127.04	73.404
May.....	102.60	97.50	73.740
June.....	105.80	85.19	74.942
July.....	105.90	83.94	70.440
August.....	107.60	111.44	73.222
September.....	128.70	115.20	75.960
October.....	132.21	101.70	81.800
November.....	136.74	84.75	82.609
December.....	151.35	79.62	78.192
Yearly average.....	114.61	110.90	75.033

*From the "Engineering and Mining Journal."

Prior to the war the world's supply of platinum was derived almost entirely from the Ural mountains, Russia, but when hostilities commenced in the fall of 1914 the Russian production was reduced almost one-third. The subsequent internal troubles further crippled the platinum industry in that country and only a relatively small production has been made during the last few years.

In view of the serious shortage in the world's supply of platinum, and more especially because of its importance as a war metal, the Imperial Munitions Board, in June, 1918, requested the Canadian Munition Resources Commission to undertake an examination of certain platinum occurrences in Alberta and British Columbia, which was done by G. C. Mackenzie, of the Mines Branch, and secretary to the commission. Dr. W. L. Uglow, of the Commission staff, and Chas. Camsell of the Geological Survey Branch, collaborated with Mr. Mackenzie in this investigation, a detailed report of which was published in the spring of 1920.¹

SILVER

The production of silver in Canada in 1921 amounted to 13,543,198 fine ounces, which at the average price for the year of 62.654 cents, was valued at \$8,485,355, as against 13,330,357 fine ounces at an average price of 100.90 cents, totalling \$13,450,330 in 1920, or an increase of 1.6 per cent in quantity and a decrease of 36.9 per cent in value.

The production in 1921 included: (a) refined silver and silver contained in silver and gold bullion, 9,080,718 fine ounces, or 67.0 per cent; (b) silver contained in blister copper and lead bullion, 1,649,057 ounces, or 12.2 per cent; and (c) silver estimated as recoverable from ores, etc., exported, 2,813,423 ounces, or 21.0 per cent. The corresponding figures in 1920 were (a) 9,201,094, or 69.1 per cent; (b) 2,373,650 ounces, or 17.8 per cent; and (c) 1,755,613 ounces or 13.1 per cent.

Although no official statistics of the production of silver had been published prior to 1887, the annual reports of the operating companies showed that from 1869 to 1885 about four million ounces of silver with a probable value of \$4,800,000 was produced. The producing mines were situated in the Port Arthur district in Ontario. From 1887 to 1893 the production ranged in value between \$300,000 and \$400,000 and was derived chiefly from Ontario and Quebec. The

¹ Final Report of the Canadian Munition Resources Commission, from November, 1915, to March, 1919, inclusive.

next three years saw a rapid increase in production due to the development of the silver-lead deposits of British Columbia, and in 1896 a production of over \$2,000,000 was recorded. From that year until 1905 the production varied between \$2,000,000 and \$3,500,000 rising rapidly during the next six years to \$17,580,455 in 1910, as a result of the discovery of the rich ores of the Cobalt district. Since then there has been a falling off in quantity, but owing to the higher price of the metal, the value of the annual production increased to a maximum of \$20,693,704 in 1918. It will be noticed in the table of production that the output for 1919 though only 50 per cent of that of 1910 or 1911, when the production was at its maximum was more than equal in value.

Production of Silver in Canada, 1887-1921

TABLE 99

Year	Ounces	Value	Cents per ounce	Year	Ounces	Value	Cents per ounce
		\$				\$	
1887.....	355,083	347,271	98·00	1906.....	8,473,379	5,659,455	66·79
1888.....	437,232	410,998	94·00	1907.....	12,779,799	8,348,659	65·33
1889.....	383,318	358,785	93·60	1908.....	22,106,233	11,686,239	52·86
1890.....	400,687	419,118	104·60	1909.....	27,529,473	14,178,504	51·50
1891.....	414,523	409,549	98·00	1910.....	32,869,264	17,580,455	53·49
1892.....	310,651	272,130	86·00	1911.....	32,559,044	17,355,272	53·30
1893.....		330,128	77·00	1912.....	31,955,560	19,440,165	60·83
1894.....	847,697	534,049	63·00	1913.....	31,845,803	19,040,924	59·79
1895.....	1,578,275	1,030,299	65·28	1914.....	28,449,821	15,593,631	54·81
1896.....	3,205,343	2,149,503	67·06	1915.....	26,625,960	13,228,842	49·68
1897.....	5,558,446	3,323,395	59·79	1916.....	25,459,741	16,717,121	65·66
1898.....	4,452,333	2,593,929	58·26	1917.....	22,221,274	18,091,895	81·417
1899.....	3,411,644	2,032,658	59·58	1918.....	21,383,979	20,693,704	96·772
1900.....	4,468,225	2,740,362	61·33	1919.....	16,020,657	17,802,474	111·122
1901.....	5,539,192	3,265,354	58·95	1920.....	13,330,357	13,450,330	100·900
1902.....	4,291,317	2,238,351	52·16	1921.....	13,543,198	8,485,355	62·654
1903.....	3,198,581	1,709,642	53·45				
1904.....	3,577,526	2,047,095	57·22				
1905.....	6,000,023	3,621,133	60·35				
				Grand total...	415,583,638	267,186,774	64·773

Ontario has been the main producer of silver in Canada for the last ten years, its contribution increasing from 41 per cent of the total for Canada in 1905 to a maximum of 94 per cent in 1911. By 1914, it had fallen to 88·4 per cent and has been gradually decreasing each year, reaching 80·4 per cent in 1918; 75·5 per cent in 1919; 74·3 per cent in 1920, and 71·9 per cent in 1921.

The production of British Columbia which has fluctuated between two and five million ounces for the last twenty-five years was from 1914 to 1917 between 11 and 13 per cent of the total Canadian production. In 1918, it amounted to 18·3 per cent; in 1919, to 23·1 per cent; in 1920, to 25·0 per cent and in 1921, to 24·8 per cent, of the total.

The balance of the production, 3·3 per cent in 1921 as against 0·7 per cent in 1920 and 2·2 per cent in 1919, was derived from Quebec, Manitoba and the Yukon Territory.

Production of Silver in Canada by Provinces, 1887-1921*

TABLE 100

Year	Ontario		Quebec		British Columbia		Yukon Territory	
	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value
		\$		\$		\$		\$
1887.....	190,495	181,630	146,898	143,666	17,690	17,301		
1888.....	208,064	195,584	149,388	140,425	79,780	74,993		
1889.....	181,609	169,980	148,517	139,012	53,192	49,787		
1890.....	158,715	166,066	171,545	179,436	70,427	73,666		
1891.....	225,633	222,926	185,584	183,357	3,306	3,266		
1892.....	41,581	36,425	191,910	168,113	77,160	67,592		
1893.....		8,689		126,439		195,000		
1894.....			101,318	63,830	746,379	470,219		
1895.....			81,753	53,369	1,496,522	976,930		
1896.....			70,000	46,942	3,135,343	2,102,561		
1897.....	5,000	2,990	80,475	48,116	5,472,971	3,272,289		
1898.....	85,000	49,521	74,932	43,655	4,292,401	2,500,753		
1899.....	202,000	120,352	40,231	23,970	2,939,413	1,751,302	230,000	137,034
1900.....	161,650	99,140	58,400	35,817	3,958,175	2,427,548	290,000	177,857
1901.....	151,400	89,250	41,459	24,440	5,151,333	3,036,711	195,000	114,953
1902.....	145,000	75,632	42,500	22,168	3,917,917	2,043,586	185,900	96,985
1903.....	17,777	9,502	28,600	15,287	2,996,204	1,601,471	156,000	83,362
1904.....	206,875	118,376	15,000	8,583	3,222,481	1,843,935	133,170	76,201
1905.....	2,451,356	1,479,442	19,620	11,841	3,439,417	2,075,757	89,630	54,093
1906.....	5,401,766	3,607,894	17,686	11,813	2,990,262	1,997,226	63,665	42,522
1907.....	9,982,363	6,521,178	16,000	10,452	2,745,448	1,793,519	35,988	23,510
1908.....	19,398,545	10,254,847	13,299	7,030	2,631,389	1,391,058	63,000	33,304
1909.....	24,822,099	12,784,126	13,233	6,815	2,649,141	1,364,387	45,000	23,176
1910.....	30,366,366	16,241,755	7,593	4,061	2,407,887	1,287,883	87,418	46,756
1911.....	30,540,754	16,279,443	18,435	9,827	1,887,147	1,005,924	112,708	60,078
1912.....	29,214,025	17,772,352	9,465	5,758	2,651,002	1,162,737	81,068	49,318
1913.....	28,411,261	16,987,377	34,573	20,672	3,312,343	1,980,483	87,626	52,392
1914.....	25,139,214	13,779,055	57,737	31,646	3,159,897	1,731,971	92,973	50,959
1915.....	22,748,609	11,302,419	63,450	31,524	3,565,852	1,771,658	248,049	123,241
1916.....	21,608,158	14,188,133	98,610	64,748	3,392,872	2,227,794	360,101	236,446
1917.....	19,301,835	15,714,975	136,194	110,885	2,655,994	2,162,430	119,605	97,379
1918.....	17,198,737	16,643,562	178,675	172,907	3,921,336	3,794,755	71,915	69,594
1919.....	12,117,878	13,465,628	140,926	156,600	3,713,537	4,126,556	27,556	30,621
1920.....	9,907,626	9,996,795	61,003	61,552	3,327,028	3,356,971	19,190	19,363
1921.....	9,761,607	6,116,037	38,084	23,861	3,350,357	2,099,133	393,092	246,288
Grand Total	320,352,998	204,685,707	2,553,093	2,208,617	89,431,603	58,289,152	3,188,654	1,945,432

*Does not include small productions from New Brunswick, Alberta, and Manitoba, in 1917, and from Manitoba in 1918, and 1919.

Important quantities of silver are being produced in Canada, both as fine metal and as bullion. Fine silver is produced at Trail, B.C., by the Consolidated Mining and Smelting Company of Canada, Limited, chiefly from the silver-lead ores, and in recent years from the copper-gold-silver ores of the province, and finds a market in Canada, the United States and China.

In Ontario, ores from the Cobalt district are treated by the Coniagas Reduction Company, Thorold, Ont.; the Deloro Smelting and Refining Company, Deloro, Ont.; the Ontario Smelters and Refiners, Ltd., with plants at Welland Chippewa, Ont. Silver bullion varying in fineness from 850 to 998.2 is produced at these works, other products being white arsenic, metallic nickel and cobalt, nickel and cobalt oxides and salts of nickel and cobalt.

Since 1918 there has been a small production of refined silver at the new refinery of the International Nickel Company of Canada at Port Colborne, Ontario, and since 1920 at Deschênes, Quebec, in the refinery of the British America Nickel Corporation.

The silver bullion from Ontario as a rule finds a market in the United States and England, but important quantities are also shipped to the Orient.

Exports from Canada and Imports of Silver, 1919, 1920 and 1921

TABLE 101

	1919	1920	1921
	\$	\$	\$
<i>Exports—</i>			
In ore, concentrates, bullion.....	16,410,797	12,238,209	7,202,663
<i>Imports—</i>			
Silver—			
Bullion in bars and blocks.....	3,458,097	2,453,450	581,861
Coins.....		100	2,083
Sterling.....	131,766	314,869	174,788
Manufactures of gold and silver—			
Leaf.....	36,105	108,788	47,123
Sweepings.....	5,303	6,605	2,771
Manufactures, n.o.p.....	136,612	184,681	97,110
Electroplated ware.....	281,443	545,015	387,974

Prices.—The average price of silver in New York as quoted by the *Engineering and Mining Journal-Press* for the year 1921 was 62.654 cents, as against 100.9 cents in 1920.

On April 23, 1918, there was approved an Act of the United States Congress entitled, "An Act to conserve the gold supply of the United States, to permit the settlement in silver of trade balances adverse to the United States, and for the above purpose to stabilize the price and encourage the production of silver. On May 6, 1919, the United States Treasury Board lifted the restrictions on exports and removed the maximum price of \$1.01½ per ounce. The price of silver then started to rise and reached the high mark of \$1.37½ in November, the year 1919 closed with silver at \$1.31 per ounce.

By the end of January, 1920, the price of silver reached \$1.35 per ounce, then it started to decline gradually to about \$1 towards the middle of May, finishing the year at the low figure of 63 cents per ounce.

Purchase of domestic silver in the United States under the Pittman Act began in May, 1920, at the rate of \$1 per ounce 1,000 fine.

The causes of the sudden rise and fall in silver prices, as stated by the *Engineering and Mining Journal* are given as follows:—

As to the rise:—

- (1) Heavy demand for Indian currency since 1914.
- (2) Enormous bullion purchases by the English Government on Indian account.
- (3) Large excess of merchandise exports from Bombay, Calcutta, and other Eastern ports.
- (4) Huge military expenditures in India, Egypt, Mesopotamia and Palestine.
- (5) Embargo on silver imports on private account.

As to the fall:—

- (1) Cessation of bullion purchases on government account in 1919.
- (2) Unfavourable balance of trade against India for the last six months, as shown by the large amount of Reserve Council Bills sold.
- (3) Unfavourable monsoon, or lack of rain during last summer and autumn.
- (4) The substitution of paper money in place of the silver rupee.

Yearly Average Prices of Silver in New York and London, 1908-1921
TABLE 102

Year	New York Cents per fine ounce	London Pence per Standard ounce (a)	Year	New York Cents per fine ounce	London Pence per Standard ounce (a)
1908.....	52.864	24.402	1915.....	49.684	23.675
1909.....	51.503	23.726	1916.....	65.661	31.215
1910.....	53.486	24.670	1917.....	81.417	40.851
1911.....	53.304	24.592	1918.....	96.772	47.516
1912.....	60.835	28.042	1919.....	111.122	57.059
1913.....	59.791	27.576	1920.....	100.900	61.590
1914.....	54.811	25.313	1921.....	62.654	36.841

(a) 925 parts fine.

Average Monthly Prices of Silver, 1919, 1920 and 1921
TABLE 103

Months	New York—Cents per fine ounce			London Pence per Standard ounce (a)
	1919	1920	1921	1921
January.....	101.125	132.827	65.950	39.985
February.....	101.125	151.295	59.233	34.745
March.....	101.125	125.551	56.023	32.479
April.....	101.125	119.779	59.337	34.250
May.....	107.135	102.585	59.810	34.165
June.....	110.430	90.957	58.510	34.971
July.....	106.394	91.921	60.260	37.481
August.....	111.370	96.168	61.597	38.096
September.....	114.540	93.675	66.160	40.082
October.....	119.192	83.480	70.970	41.442
November.....	127.924	77.734	68.234	38.750
December.....	131.976	64.774	65.760	35.645
Average for the year.....	111.122	100.900	62.654	36.841

(a) 925 parts fine. From "Engineering and Mining Journal-Press."

QUEBEC

The small quantity of silver credited to Quebec province for a number of years represents the silver recovery from the pyritic ores mined at Eustis and Weedon in the Eastern Townships, and the lead-zinc ores of Notre-Dame-des-Anges, Portneuf County. During 1921, the production was 38,084 fine ounces valued at \$23,861, as against 61,003 fine ounces valued at \$61,552 in 1920.

ONTARIO

The production of silver in Ontario in 1921 was 9,761,607 fine ounces valued at \$6,116,037, as against 9,907,626 fine ounces, valued at \$9,996,795 in 1920, a decrease of about 1.5 per cent in quantity and 39.1 per cent in value. In 1911 the total for Ontario amounted to some 30,540,754 fine ounces, but during the following years the production gradually decreased.

The silver ores of the Cobalt and adjoining districts, which in the early days of development were all exported for treatment, are now being reduced to an increasing extent each year within the camp by a combination of amal-

gamation, flotation and cyanide processes with the recovery of silver bullion. More complete statistics have been compiled in a special chapter on the silver-cobalt mining industry, covering the mines in active operation during 1921.

During 1921 a total of 5,060,454 ounces or 51.8 per cent of the total Canadian output was produced and sold as bullion in the Cobalt district; 3,884,683 ounces or 39.8 per cent was recovered and sold by the silver smelters of South Ontario; and 120,336 ounces or 1.3 per cent was contained in gold bullion, so that 92.9 per cent of the total production was obtained in the form of bullion within the province, leaving a balance of 683,586 ounces or 7.1 per cent recovered from Canadian minerals and mattes treated in the United States. The corresponding figures for 1920 were; as bullion in Cobalt district, 5,711,494 ounces or 58.6 per cent; in the South Ontario smelters, 3,334,724 ounces or 33.7 per cent; contained in gold bullion, 99,311 ounces or 1.0 per cent; total as bullion within the province, 92 per cent; and balance treated in United States 762,097 ounces or 7.7 per cent.

The following table shows the percentage of production from the camp, the South Ontario smelters, and from ores exported to the United States:—

Percentage of Silver Production Credited to each Group Treating Ontario Ores, 1914-1921

TABLE 104

Producing Group	1914	1915	1916	1917	1918	1919	1920	1921
	%	%	%	%	%	%	%	%
Cobalt district....	41.0	41.0	39.5	51.1	55.0	48.7	58.6	51.8
Ontario smelters...	36.0	43.0	44.7	33.9	29.0	36.4	33.7	41.1
Total for Ontario..	77.0	84.0	84.2	85.0	84.0	85.1	92.3	92.9
U.S. smelters.....	23.0	16.0	15.8	15.0	16.0	14.9	7.7	7.1
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Shipments from the silver mines of Ontario to United States smelters amounted in 1921 to 1,024 tons of ore and concentrates with a silver content of 490,704* ounces, as against 1,724 tons containing 675,918 ounces in 1920 and 4,901 tons containing 1,780,617 ounces in 1919. Complete detailed statistics of the 1921 shipments may be seen in the special chapter on the silver-cobalt mining industry.

The production in 1921 included in addition to the output of the silver camp, and the recovery at the Port Colborne and Deschênes refineries, 120,336 ounces of silver contained in gold bullion from the gold mines, as against 99,311 ounces in the previous year, 92,805 ounces in 1919, and 73,013 ounces in 1918.

MANITOBA

The silver production in Manitoba has been derived from the gold and copper ores of The Pas District. Owing to the high freight rates and the poor transportation facilities no copper ores were produced in 1921, and it was only under the most favourable market conditions such as obtained in the great war that these ores could be mined at a profit. There was consequently very little silver produced during 1921. The total production during the year was derived from gold bullion and only amounted to 33 ounces. In 1920, when a considerable shipment of copper ore was made, the production was 15,510 ounces, valued at \$15,649, as against 20,700 ounces, valued at \$23,069, in 1919, and 13,316 ounces, valued at \$12,886, in 1918.

*In addition to this 490,704 oz. contained in exported ores and concentrates there was a considerable quantity contained in exports of residues and mattes from the South Ontario smelters.

BRITISH COLUMBIA

The silver production in British Columbia amounted in 1921 to 3,350,357 fine ounces valued at \$2,099,133, as against 3,327,028 fine ounces valued at \$3,356,971, in 1920, or an increase of 0.7 per cent in quantity and a decrease of 37.4 per cent in value.

The chief sources of the silver production in this province are the silver-lead-zinc ores of the East and West Kootenays supplemented by the silver contained in the gold-copper ores of Rossland, the boundary and coast districts and also that derived from the Premier Gold Mine near Stewart and the Dolly Varden Silver Mine at Alice Arm.

The production in 1921 included: (a) contained in blister copper, 549,596 ounces or 16.5 per cent; (b) contained in lead bullion, 1,090,643 ounces or 32.5 per cent; (c) in lead and zinc ores and concentrates exported, 151,234 ounces or 4.5 per cent; and (d) in gold, silver or copper ores exported 1,558,528 ounces or 46.5 per cent.

The corresponding figures for 1920 were (a) 1,145,165 ounces or 34.4 per cent; (b) 1,131,116 ounces or 34.0 per cent; (c) 713,125 ounces or 21.4 per cent and (d) 337,622 ounces or 10.2 per cent.

**Production of Silver in British Columbia by Districts,
1919, 1920 and 1921***

TABLE 105

	1919	1920	1921
Cariboo—			
Omineca division.....	72,573	103,020	3,745
Cassiar—			
Atlin.....			1,808
Skeena, etc.....	920,413	1,317,832	1,563,999
Kootenay, East—			
Fort Steele division.....	205,500	362,143	546,631
Other divisions.....	68,634	53,510	18,508
Kootenay, West—			
Ainsworth division.....	167,453	266,963	115,772
Slocan division.....	1,556,714	738,515	188,142
Nelson division.....	44,280	7,065	2,130
Trail Creek division.....	27,788	36,411	60,184
Revelstoke, Trout Lake, and Lardeau.....	2,994	7,979	3,871
Yale—			
Boundary.....	222,680	385,681	160,051
Similkameen Nicola.....	6,823	4,876	
Yale, Ashcroft, and Kamloops.....	2,096	437	
Lillooet.....	365		
Southern Coast—			
Vancouver Island.....	9,936	2,745	605
Mainland.....	94,870	90,672	7,943
Total.....	3,403,119	3,377,849	2,673,389

*From the Minister of Mines Reports, British Columbia.

YUKON

The silver production of the Yukon Territory in 1921 increased considerably on account of shipments of silver-lead ores being again made from the Mayo district.

In 1921 the production amounted to 393,092 fine ounces valued at \$246,288, as against 19,190 fine ounces valued at \$19,363 in 1920, and 27,556 ounces valued at \$30,621 in 1919. The production for 1921 was the highest yet recorded and was due to the activities of the Keno Hill Limited mines on Keno Hill. In 1915 and 1916, the yearly production was augmented by the output from the copper

mines of the Whitehorse and the gold mines of the Conrad districts. The respective percentages of silver won from lode and placer mining in 1921 were 96.2 per cent and 3.8 per cent, as against 14.6 per cent for lode mining and 85.4 per cent for placer mining in 1920. The figures for the former years were as follows: 1919, lode mining, 26 per cent; placer mining, 74 per cent; and for the years 1918, 1917 and 1916, lode mining contributed 68.2 per cent, 66.8 per cent, and 87 per cent, respectively.

On an average about one ounce of silver is contained in each five ounces of crude bullion from alluvial workings.

TIN

Tin ores have not yet been found in sufficient quantities in Canada to be of economic importance.

The occurrence of tin ore has been reported from several localities, the most important perhaps being the discovery of cassiterite, near New Ross, Lunenburg county, N.S. Reports upon it may be found in the Summary Reports of the Geological Survey Branch of the Department of Mines for 1907, 1908, 1910, 1911, and 1912.

Cassiterite occurs in a few scattered crystals in pegmatite dykes in the drainage basin of McDougal creek, Lardeau division, B.C., and it has been found also in black sands in the Atlin district, B.C., and in the alluvial sands of Dublin gulch, Mayo district. Y. T.

The occurrence of tin has been noted in some bodies of sulphide minerals found in the vicinity of West Hawk and Star lakes, near the boundary line between Ontario and Manitoba. Attention is called to these occurrences not on account of their commercial importance, but for the interesting manner of occurrence and the mineral associations.

Ores of tin which are imported from South America have in the past been reduced in Canada. The Electro Tin Products Company of Brantford, Ontario, although idle throughout 1921, formerly operated a plant for treating Bolivian tin ores. The plant comprised roasting furnaces, electric smelting and slag cleaning furnaces.

Imports of Tin into Canada, 1919, 1920 and 1921

TABLE 106

Item	1919		1920		1921	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
Tin in blocks, pigs and bars.	3,716,300	2,105,227	4,801,000	3,029,964	2,566,600	840,278
Tin, foil.....	976,521	412,158	1,834,220	513,688	1,391,011	330,630
Strip waste.....	69,144	1,444	128,120	5,082	19,098	469
Collapsible tubes.....		87,095		122,339		73,070
Tinware, etc. (a).....		825,177		932,398		481,087
Tin, crystals.....		(b) 1,926		(c)		(c)
Bichloride of tin.....	42,675	21,968	51,098	24,261	25,015	6,915
Total.....		3,454,995		4,627,732		1,732,449

(a) Tinware, plain, japanned or lithographed, and all manufactures of tin, n.e.s.

(b) Covers first quarter of 1919, after April 1, 1919, tin crystals are included with "Bichloride of Tin."

(c) Included with "Bichloride of Tin."

TUNGSTEN

There was no production of tungsten in Canada during 1919, 1920 and 1921.

The year 1921 saw further decreases in the price of tungsten, which at the beginning of January was quoted at from \$4 to \$4.50. By the middle of the month it fell to \$3.25 and \$3.50 and remained at this point until September. During the last quarter of the year, the quotations were \$2.50 to \$3 with market conditions quiet.

ZINC

The production of zinc in Canada during 1921 amounted to 53,089,356 pounds (26,544.6 tons) which at the average price for the year of 4.655 cents per pound, was valued at \$2,471,310, as against 39,863,912 pounds (19,932 tons), valued at \$3,057,961, or an average of 7.671 cents per pound in 1920.

The production in 1921 included: (a) 52,988,000 pounds refined zinc produced at Tadanac, near Trail, B.C., and (b) 101,356 pounds estimated as recovered from ores and concentrates exported to the United States.

The production in 1920 included 37,034,000 pounds of refined zinc produced at Tadanac and 2,829,912 pounds estimated as recoveries from ores and concentrates exported.

During the year no zinc ores or concentrates were exported from Notre-Dame-des-Anges in Quebec which in 1920, was credited with 1,120,200 pounds. In former years residues from the milling of gold ores in Porcupine, Ontario which were treated abroad, contained zinc. In 1920 some 14,000 pounds was estimated as recovered but in the year under review no shipments of this kind were reported.

Production of Zinc in Canada, 1911-1921

TABLE 107

Calendar Year	*Quantity	Value	Average price per pound
	Pounds	\$	Cents.
1911.....	1,877,479	108,105	5.758
1912.....	4,283,760	297,421	6.943
1913.....	5,640,195	318,558	5.648
1914.....	7,246,063	377,737	5.213
1915.....	9,771,651	1,292,789	13.230
1916.....	23,364,760	2,991,623	12.804
1917.....	29,668,764	2,640,817	8.901
1918.....	35,083,175	2,862,436	8.159
1919.....	32,194,707	2,362,448	7.338
1920.....	39,863,912	3,057,961	7.671
1921.....	53,089,356	2,471,310	4.655

*Estimated smelter recoveries, including for years 1916 to 1921 the actual zinc recovered at Trail, B.C.

The total shipments of zinc ores and concentrates from the mines in Canada in 1921, including the zinc-lead ores from the Sullivan Mine, East Kootenay, B.C. and ores exported to the United States, amounted to about 297,406 tons valued by the operators at \$1,498,716 or an average of \$5.04 per ton and containing 98,799,093 pounds of zinc.

In 1920 the shipments of ores and concentrates were 249,136 tons, valued by the operators at \$1,157,844, or an average of \$4.65 per ton, and containing 91,033,202 pounds of zinc.

Detailed statistics covering silver-lead-zinc mining are set forth in a special chapter describing that industry.

TABLE 108 Shipments of Zinc Ores from Canadian Mines, 1898-1921

Year	Zinc ore shipped		Metallic zinc in ore shipped	Year	Zinc ore shipped		Metallic zinc in ore shipped
	Tons	Value	Pounds		Tons	Value	Pounds
		\$				\$	
1898.....	1,162	11,000	788,000	1910.....	5,063	120,003	4,361,712
1899.....	865	18,165	814,000	1911.....	2,590	101,072	2,346,849
1900.....	261	4,810	212,000	1912.....	6,415	215,149	5,354,700
1901*.....				1913.....	7,889	186,827	7,069,800
1902.....	158	1,659	142,200	1914.....	10,893	262,563	9,101,460
1903.....	1,000	10,500	900,000	1915.....	14,895	554,938	12,231,439
1904.....	597	3,700	477,568	1916.....	82,077	1,086,249	48,498,078
1905*.....	9,413	139,200	*	1917.....	116,489	1,323,985	64,655,713
1906*.....	1,154	23,800	*	1918.....	121,200	1,228,195	63,026,464
1907*.....	1,573	49,100	*	1919.....	135,535	1,049,493	59,959,709
1908*.....	452	3,215	*	1920.....	249,136	1,157,844	91,033,202
1909 †.....	18,371	242,699	16,468,204	1921.....	297,406	1,498,716	98,799,093

*Figures not available.

† Includes 7,424 tons shipped late in 1908.

The ores shipped also contained a varying amount of silver for which payment was made by the smelter and without which on account of the import duty to the United States and the long rail haul, it would not in many cases pay to ship.

TABLE 109 Summary of Zinc Statistics, 1919, 1920 and 1921

	1919	1920	1921
Ores and concentrates shipped.....	Tons. 135,535	249,136	297,406
Value.....	\$1,049,493	\$1,157,844	\$1,498,716
Zinc production.....	Tons. 13,097	19,932	26,544
Value.....	\$2,362,448	\$3,057,961	\$2,471,310
Refined zinc product.....	Tons. 12,326	18,517	26,494
Imports of zinc (a).....	Tons. 13,223	13,636	8,693
Value.....	\$2,131,176	\$2,458,205	\$1,309,272
Imports of brass and manufactures of.....	Value. \$4,257,738	\$6,337,775	\$3,521,502
Exports of ".....	\$1,685,941	\$851,511	\$286,029
Exports of zinc ore.....	Tons. 6,630	3,126	52
Value.....	\$296,212	\$122,387	\$1,293
Exports of metallic zinc.....	Tons. 3,847	3,490	12,828
Value.....	\$701,249	\$512,279	\$1,336,389

(a) Includes manufactures of zinc valued at \$43,155 in 1919, at \$96,961 in 1920, and \$53,946 in 1921.

Refining.—With the exception of a small production in experimental work there was no recovery of zinc spelter or refined zinc in Canada previous to 1916. The production of zinc was therefore recorded in terms of the tonnage of ore shipped and its metal contents. The establishment of an electrolytic refinery at Trail placed the metallurgy of this metal in Canada on a similar basis to that of lead and copper and its production has since been recorded in the same way.

The production of refined zinc at Trail in 1921 was 26,494 tons against 18,517 tons in the previous year, 12,326 tons in 1919, and 12,574 tons in 1918 and 9,985 tons in 1917, and 2,974 tons in 1916, or a total of 82,870 tons since operations were first started.

The zinc industry was made the subject of a special report in 1905 by a commission appointed to investigate the zinc resources of British Columbia, and the conditions affecting their exploitation.¹

In 1916 a brief report was made by Dr. A. W. G. Wilson, on the production of spelter in Canada, and conditions in connection with the home treatment of British Columbia zinc ore.²

¹ Mines Branch No. 12. Report of the Commission on the Investigation of the Zinc Resources of British Columbia, 1905. (Out of print).

² Mines Branch No. 428. Report on the Production of Spelter in Canada, 1916. Dr. A. W. G. Wilson.

A report on the zinc-lead deposits of Notre-Dame-des-Anges was made by J. A. Bancroft and published in the Annual Report of the Bureau of Mines, Quebec, for 1915.¹

The Provincial Bureau of Mines of Ontario also published in 1916 a report on the lead and zinc deposits of Ontario and Eastern Canada.²

During 1913 the new United States Customs tariff came into effect, considerably reducing the duties payable on Canadian ore, the new items affecting Canadian shipments being:—

“Zinc ores containing 25 per cent or more zinc: 10 per cent on zinc contained therein. Lead bearing ore: three-quarter cents per pound on lead contained therein.”

There is also a duty of 15 per cent on metallic zinc exported to the United States, and at present an import duty of $7\frac{1}{2}$ per cent on zinc and other materials imported into Canada from the United States.

Although not paid for by the United States smelters, the lead in ore is considered as dutiable and as there is often a small lead content in the zinc ore or concentrates shipped, the lead duty applies. Following the decrease in duties there has been a considerable increase in zinc shipments.

Imports into Canada of Zinc and Zinc Products, 1920-1921

TABLE 110

Zinc and Zinc Products	1920			1921		
	Product in Pounds	Value of Product	Zinc Content in Pounds	Product in Pounds	Value of Product	Zinc Content in Pounds
		\$			\$	
Zinc, in blocks, pigs and sheets...	3,452,892	410,772	3,452,892	2,783,001	247,475	2,783,001
Zinc, as spelter.....	1,555,068	122,745	1,555,068	1,110,844	56,683	1,110,844
Zinc white (80% Zn.).....	21,254,272	1,829,620	17,003,418	12,751,203	886,784	10,200,962
Zinc dust (90% Zn.).....	378,556	50,597	340,700	434,981	46,440	340,700
Zinc, sulphate and chloride of (44% Zn.).....	631,314	44,471	277,778	306,248	17,944	134,747
Total.....	27,272,102	2,458,205	22,629,856 (11,314.9 tons)	17,386,277 (8,693.1 tons)	1,255,326	14,570,254 (7,285.1 tons)
Zinc, manufactures of.....		96,961			53,946	
Grand total.....		2,555,166			1,309,272	
Brass, in blocks, pigs and ingots (30% Zn.).....	360,400	72,451	108,120	120,600	16,860	36,180
Brass, old and scrap (30% Zn.)....	3,538,700	533,534	1,061,610	5,362,900	289,724	1,608,870
Brass, tubing (30% Zn.).....	1,076,278	400,149	322,883	735,302	194,794	220,591
Brass, plain wire (30% Zn.).....	259,957	90,987	77,987	235,906	64,125	70,772
Total.....	5,235,335	1,097,121	1,570,600 (785.3 tons)	6,454,708	565,503	1,936,413 (968.2 tons)
Brass, bars and rods.....	2,267,400	525,235		723,500	135,750	
Brass, strips, sheets or plates.....	1,482,200	431,236		1,170,200	259,844	
Brass, wire cloth, n.o.p.....		485,198			345,327	
Brass, cup for manuf. of shells.....		247,698			75,348	
Brass, caps for electric batteries..		7,508			5,073	
Brass, hand-pumps.....		22,258			21,081	
Brass, nails, tacks, etc.....		9,050			2,044	
Brass and copper rivets, burrs and washers.....		35,789			39,373	
Brass, valves.....		562,153			186,036	
Brass, other manufactures, n.o.p....		2,914,529			1,886,123	
Total.....		5,240,654			2,955,999	
Grand total.....		6,337,775			3,521,502	

¹ Geology of part of the Township of Montauban and Chavigny, and of the Seigneurie de Grondines, by J. A. Bancroft, Annual Report of Province of Quebec for 1915.

² Lead and zinc Deposits of Ontario and Eastern Canada, by W. L. Uglow, Annual Report of the Ontario Bureau of Mines for 1915, Vol. XXV, Part II.

Exports of Zinc and Brass from Canada, 1919, 1920 and 1921

TABLE 111

Items	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
Zinc ore..... Tons	6,630	\$ 296,212	3,126	\$ 122,387	52	\$ 1,293
Zinc spelter..... "	3,847	701,249	3,490	512,279	12,828	1,336,389
Brass—						
Old and scrap..... Lb.	9,656,900	1,275,448	3,439,800	475,809	2,096,700	126,832
Rods, sheets and						
tubing..... "	535,500	173,654	244,000	49,728	9,300	2,393
Valves..... "		236,839		325,794		156,804

There is at present in Canada only one company operating an electrolytic zinc plant, namely, the Consolidated Mining and Smelting Company of Canada, Limited, at Trail, B.C.

Two other experimental plants were operated during the war only. They were:—

(a) The plant of the Electro Zinc Company which used the Watt's process and was designed to recover refined zinc from the ores of Notre-Dame-des-Anges, Que.

(b) The plant of the French Complex Ore Reduction Company, which used the French process, and was established near Nelson, B.C. This plant was idle during 1921.

The Trail plant of the Consolidated Mining and Smelting Company started regular commercial operations early in 1916, and in July it was reported to be producing 20 tons per day. Later in the year the company undertook to increase its capacity to 45 tons. Early in 1917 it was reported to be producing 45 tons per day, and its capacity is now rated at 80 tons.

Production of Zinc in British Columbia by Districts, 1919, 1920 and 1921*

(Contents of ore shipped in pounds)

TABLE 112

	1919	1920	1921
Kootenay, East—			
Fort Steel division.....	46,460,703	42,881,092	49,319,198
Windermere—Golden.....			
Kootenay, West—			
Ainsworth.....	36,785	158,193	62,629
Nelson.....			
Slocan.....	10,015,624	3,715,471	65,984
Revelstoke, etc.....			
Boundary-Yale—			
Kamloops, etc.....			
Cariboo—			
Omineca.....	224,539	453,152	11,561
	56,737,651	47,208,268	49,419,372

*From the Minister of Mines Report, British Columbia.

Bounties.—An act to provide for the payment of bounties on zinc produced from zinc ores mined in Canada was passed by the House of Commons of Canada, May 3, 1916. This Act was cited as "Zinc Bounties Act, 1916."

A new Act was passed by the House of Commons of Canada, May 24, 1918, and cited as "The Zinc Bounties Act, 1918."

No bounties were paid until 1919, when \$108,563.32 was paid on 10,107,704 pounds of zinc, covering the period from June, 1918, to March, 1919. During the fiscal year ending March 31, 1920, the amount of bounty paid on zinc was \$249,246.04 and for the period March 31 to July 31, 1920, the amount paid was \$42,190.64. No bounties on zinc have been paid since the latter date.

Prices.—The price of zinc in St. Louis averaged 4.655 cents per pound for the year 1921. In January, the price was 5.413 cents but it gradually declined to 4.186 cents in August, recovering in December to 4.837 cents. No quotations were published showing the New York prices. The difference is usually about one-half cent per pound, the New York quotations being greater.

Monthly Average Price of Zinc (Spelter) at Montreal,† 1917-1921

(In cents per pound)

TABLE 113

	1917	1918	1919	1920	1921
January.....	10.74	8.48	8.00	11.284	6.561
February.....	11.27	8.50	7.215	11.275	6.607
March.....	11.64	8.17	7.03	9.856	6.686
April.....	10.45	7.51	6.968	10.279	6.588
May.....	10.19	7.87	6.954	9.812	6.809
June.....	20.16	8.62	7.624	9.817	6.556
July.....	9.48	9.28	8.912	10.085	6.311
August.....	9.11	9.60	9.067	10.113	6.126
September.....	8.88	10.23	8.777	9.239	6.190
October.....	8.70	9.64	9.086	8.41	6.454
November.....	8.50	9.24	9.489	7.759	6.550
December.....	8.35	9.04	10.289	6.769	6.673
Average.....	9.79	8.85	8.284	9.558	6.509

†Producers prices for carload quantities ex cars Montreal, as furnished by Messrs. The Consolidated Mining and Smelting Company of Canada, Limited, Montreal.

Average Price of Spelter at New York and St. Louis,* 1919, 1920 and 1921

(In cents per pound)

TABLE 114

Month	1919	1920	1921
January.....	7.272	9.483	5.413
February.....	6.623	9.058	4.928
March.....	6.500	8.881	4.737
April.....	6.464	8.534	4.747
May.....	6.429	7.938	4.848
June.....	6.901	7.815	4.421
July.....	7.873	8.070	4.239
August.....	7.789	8.185	4.186
September.....	7.510	7.717	4.235
October.....	7.823	**	4.605
November.....	8.177	**	4.665
December.....	8.700	**	4.837
Average.....	7.338	7.671	4.655

*From the "Engineering and Mining Journal-Press"; St. Louis price for 1921.

**No quotations for last three months 1920.

Average Price of Spelter, Ordinary Brands, in London,* **1919, 1920 and 1921**

(In pounds sterling per long ton)

TABLE 115

Month	1919			1920			1921		
	£	s	d	£	s	d	£	s	d
January.....	50	15	11	59	10	4	25	15	7
February.....	42	11	6	62	3	7	25	5	5
March.....	37	10	3	54	16	8	25	10	5
April.....	35	18	3	48	9	5	26	1	6
May.....	35	13	9	46	0	9	27	6	7
June.....	36	19	6	42	2	11	27	2	2
July.....	42	3	10	42	13	4	26	12	0
August.....	39	16	9	41	19	6	25	8	1
September.....	41	8	5	40	5	6	25	10	8
October.....	43	17	12	40	5	6	26	10	8
November.....	46	17	3	35	14	8	26	4	10
December.....	53	9	3	28	11	6	27	0	11
Average.....	42	5	3	45	4	6	26	4	1

*From the annual publication of the "Metal Information Bureau," London, E.C.

World's Production of Zinc, 1913 and 1916-1921*

(In metric tons, by countries where smelted.)

TABLE 116

	1913	1916	1917	1918	1919	1920	1921
Australia—							
Tasmania.....			49	3,883	3,727	-5,911	1,791
Mainland.....	4,187	5,362	4,769	5,712	3,625	3,909	
Austria.....	21,707	11,600	12,600	12,000	(a)	(a)	240
Belgium.....	204,220	22,930	10,290	9,245	19,860	84,260	66,470
Canada.....		2,698	9,058	11,139	11,182	16,798	24,035
France.....	67,890	20,258	22,929	18,347	10,800	19,655	24,358
Germany—							
Upper Silesia.....	169,439	122,489	128,832	122,961	74,023	81,482	93,000
Other Germany.....	109,400	55,326	57,700	48,900	11,000	16,000	
Great Britain.....	66,243	52,629	51,918	39,001	38,227	25,000	5,776
Italy.....		258	367	1,188	1,282	1,172	380
Japan.....	900	38,994	54,718	39,915	19,816	10,885	7,000
Jugoslavia and Czechoslovakia.....	(b)	(b)	(b)	(b)	4,010	6,000	9,000
Netherlands.....	24,323	12,101	4,059	681	.....	2,031	6,405
Norway.....	9,287	1,833	1,752	1,855	3,386	1,837	(c)
Poland.....	(d)	(d)	(d)	(d)	4,652	5,361	6,000
Russia.....	10,500	1,100	8,334	4,893	(e)	(e)	(e)
Siberia.....		213	569	(c)	(c)	(c)	(c)
Spain.....	6,003	8,523	10,155	15,900	16,314	9,647	3,600
Sweden.....	2,115	9,997	7,979	4,098	2,321	5,759	(b)
United States.....	314,498	606,307	607,423	469,853	422,513	420,366	181,890
Known output..	1,010,700	972,600	993,500	810,000	647,000	716,000	.....

(a) See Jugoslavia and Czechoslovakia. (b) Included in Austria. (c) Statistics not available.

(d) Included in Russia. (e) See Poland.

*From U.S. Geol. Survey Report.

NON-METALLICS

ABRASIVES

CORUNDUM

Shipments of grain corundum during 1921 amounted to 403 tons, or 44 per cent more than the sales reported for the previous year. Some 11,256 tons of old mill tailings were treated, from which approximately 407 tons of grain corundum was recovered, the percentage of recovery being 3.6 per cent as against 2.5 per cent in 1920.

Corundum is found in an area embracing several townships in Renfrew and Hastings counties, in the province of Ontario. The industry made its appearance there in 1900, the production reaching a maximum in 1906. From 1907 to 1913 the yearly production was smaller, but fairly uniform. Operations were indefinitely suspended during August, 1918, but were renewed again in 1919, since which time old tailings have been treated for the recovery of grain corundum.

Corundum Production in Canada, 1917-1921

TABLE 117

(In Short Tons)

Calendar Year	Corundum-bearing rock treated	Grain corundum graded	% Recovery	Grain Corundum				Average price, cents per pound
				Sold in Canada	Exported	Total	Total value	
1917.....	4,659	188	4.0	16	172	188	\$ 32,153	8.55
1918.....	3,184	137	4.3	0	137	137	26,112	9.9
1919.....	1,300	26	2.0	0	0	0	0	0.
1920.....	(a) 13,025	322	2.5	20	176	196	24,547	6.25
1921.....	(a) 11,256	407	3.6	0	403	403	55,965	6.94

(a) Tailings only.

GRINDSTONES, PULPSTONES AND SCYTHESTONES

The provinces of Nova Scotia and New Brunswick continued to be the only producers of grindstones in Canada; the latter province also, produced pulpstones and scythestones. Shipments for 1921 totalled 1,281 tons valued at \$64,607 or a decrease of 48 per cent in quantity and 27 per cent in value from the sales for 1920.

Grindstones were marketed in Canada and United States at prices ranging from \$30 to \$40 per ton, while the prevailing prices during the previous twelve months were \$30 to \$62 a ton.

The firms reporting operations were, the Mic Mac Grindstone Company, Limited, Woodburn, N.S.; the Miramichi Quarry Company Limited, Quarryville, N.B.; and the Read Stone Company, Stonehaven, N.B.

Production, Imports and Exports of Grindstones, 1919, 1920 and 1921

TABLE 118

	1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
<i>Production—</i>						
Nova Scotia..... Tons	283	9,000	211	8,440	183	6,990
New Brunswick.... “	1,737	51,516	2,233	79,696	1,098	57,077
Total....	2,020	60,516	2,444	88,136	1,281	64,067
<i>Imports—</i>						
Grindstones.....		281,066		312,672		448,055
Burrstones in blocks, etc..... No.	1,106	3,421	343	1,655	668	4,844
Emery in bulk, crushed or ground.....		38,106		69,462		44,490
Emery and carborundum wheels and manufac- tures.....		316,322		471,853		197,049
Pumice and pumice stone ground.....		29,910		57,068		21,528
Iron sand or globules for polishing and sawing....		10,247		17,000		13,723
Sandpaper, emery paper, etc.....		362,069		560,180		252,804
Artificial abrasives.....		82,866		251,260		74,083
<i>Exports—</i>						
Grindstones, manufac- tured.....		38,682		41,705		24,915
Stone for the manufacture of grindstones.... Tons					91	2,686
<i>Abrasives—</i>						
Natural, n.o.p.....Cwt.	8,529	10,743	81,330	236,569	34,285	83,773
Artificial, crude, includ- ing carborundum Cwt.		1,040,132	598,664	1,579,508	139,146	522,531
Artificial, made up into wheels, stones, etc.....		14,858		41,138		18,752

TRIPOLITE

Tripolite is a silicious material closely related to quartz and is used extensively as an abrasive product. It is calcined in rotary furnaces before shipment to the United States for further treatment. The total Canadian production is derived from deposits located at Silica Lake, Colchester County, Nova Scotia.

Shipments of tripolite during 1921 were considerably higher than those of the previous year, amounting to 341 tons with a value of \$11,268. The average price of \$33 per ton which prevailed during 1920, continued throughout the following year.

Tripolite in Canada, 1919, 1920 and 1921

TABLE 118 (a)

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Production.....	565	11,300	260	8,600	341	11,268

ACTINOLITE

The milling of actinolite was carried on during only $12\frac{1}{2}$ days in 1921 during which time a total of 109 tons was milled and a total of 78 tons was ground and bagged for shipment. The crude ore was quoted at \$6 a ton, but the mill product commanded a somewhat higher figure, the value of the shipments totalling \$975, an average of \$12.50 a ton.

Production of actinolite in Canada has been confined to Elzevir and Kaladar townships, in Hastings and Addington counties, province of Ontario, the centre of the industry being Actinolite.

Actinolite is used as an ingredient for coal-tar roofing compounds, the grinding of the crude material being done in such a way as not to destroy the fibre.

The only shipper was the Actinolite Mining Company of Bloomfield, New Jersey, U.S.A. This company owns the deposit noted, and also a grinding mill at Actinolite.

Production of Actinolite in Canada, 1919, 1920 and 1921

TABLE 119

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
Production.....	80	\$ 880	100	\$ 1,160	78	\$ 975

ARSENIC

There was a decrease of approximately 25 per cent in the production of arsenic during 1921, as compared with the previous year. Shipments reported for the year totalled 1,491 tons, valued at \$233,763, and consisted entirely of white arsenious oxide produced in the smelting of silver-cobalt-nickel ores from the Cobalt district. During 1920 a considerable quantity of arsenic was recovered from the arsenical gold concentrates shipped by the Hedley Gold Mining Company to the Tacoma smelter, but during the period under review the Hedley Company did not carry on any operations. The Howrey Creek Gold Mining Corporation in Ontario (Sudbury district) also made some trial shipments of gold concentrates in 1920 but did not operate during the year just closed.

White arsenic (As_2O_3) is used principally in the manufacture of insecticides, such as lead arsenate, paris green, calcium arsenate, london purple, and cattle and sheep dips. It is also used in the glass industry for the purpose, it is said, of imparting brilliancy to the product. In addition to these uses, a small quantity is consumed in the tanning, dyeing and pharmaceutical industries.

During 1921, the price of white arsenic dropped from 11 cents in January to $7\frac{1}{4}$ cents per pound in December, the average for the year being 8.85 cents. The price during the previous year ranged from 9 cents to $14\frac{1}{2}$ cents per pound with an average of 12 cents for the period. These quotations were taken from the *Engineering and Mining Journal-Press*.

Production, Exports and Imports of Arsenic, 1919, 1920 and 1921

TABLE 120

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
<i>Production—</i>		\$		\$		\$
From arsenical concentrates.....	530	21,218	628	22,231	.....	.....
White arsenic.....	2,859	488,706	1,831	425,617	1,491	233,763
Total.....	3,389	509,924	2,459	447,848	1,491	233,763
<i>Exports—Arsenic.....</i>	2,506	355,654	1,655	313,311	767	108,535
<i>Imports—</i>	Pounds		Pounds		Pounds	
White arsenic.....	4,706	1,325	962	201	1,847	230
Sulphide of arsenic.....	304,694	26,613	337,153	43,447	185,685	26,348
Arseniate of soda.....	5,566	1,661	48,863	10,568	11,993	3,002

ASBESTOS

The total quantity of asbestos rock mined during 1921 amounted to 2,063,821 tons which was approximately the same quantity as in 1917, but was about one million tons less than the 1920 record, of 3,142,827 tons. Of the rock raised, 1,673,685 tons, or 81 per cent, was milled and 123,377 tons was recovered of which 75 per cent, or 92,761 tons, was sold at an average value to the mine operator of \$52.89 per ton. During the previous year the corresponding average value per ton was \$74.12.

As in previous years the entire production was derived from the well known deposits in the Eastern Townships of Quebec.

During the year some prospecting work was done on a deposit of chrysotile asbestos near Arrowhead, in the Landeau Mining Division, British Columbia. It was reported that the short-fibre asbestos found on this deposit did not possess sufficient tensile strength to permit its use for spinning purposes but it was stated that it should be suitable for use as a filler for textiles.

Canadian exportations of asbestos (crude and milled) during 1921 were as follows: to United Kingdom 4,423 tons valued at \$512,009; to United States 43,374 tons at \$2,878,172; to Australia 175 tons at \$21,438; Belgium 3,524 tons at \$418,518; France 1,932 tons at \$348,504; Germany 3,437 tons at \$493,024; Italy 230 tons at \$32,100; Japan 1,842 tons at \$148,430; Netherlands 3,923 tons at \$560,873 and to other countries 480 tons valued at \$52,243.

Output, Sales and Stocks of Asbestos in Canada, 1921

TABLE 121

Classification	Total output	Sold or Shipped			Quantity in stock on hand at end of period
		Quantity	Total sales value at mill	Average value per ton	
	Tons	Tons	\$	\$	Tons
Crude No. 1.....	653	222	273,007	1,229.76	879
Crude No. 2.....	1,741	563	334,134	593.50	1,840
Fiberized Crude.....	688	141	59,350	420.92	1,043
Spinning Stocks.....	9,914	4,961	1,272,700	256.12	6,236
Shingle Stocks.....	19,325	10,990	1,031,634	93.87	11,530
Mill Board Stocks.....	3,788	3,242	222,334	68.58	1,893
Paper Stocks.....	32,595	26,944	1,263,266	46.88	11,730
Paper Fillers.....	27,199	20,262	308,379	15.22	10,396
By-Products (asbestos sand, finish, floats).....	27,474	25,428	141,419	5.56	6,741
Total.....	123,377	92,761	4,906,230	52.89	52,288

Summary Statistics on Asbestos, 1919, 1920 and 1921

TABLE 122

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Rock mined	3,082,384		3,142,827		2,063,821	
Rock milled.....	2,636,783		2,668,946		1,673,685	
Output—						
Milled.....	153,507		165,348		120,983	
Crude.....	4,065		4,098		2,394	
Total.....	157,572		169,446		123,377	
Mill recovery %.....	5.8		6.2		7.3	
Sales—						
Asbestos.....	136,765	10,909,452	178,617	14,734,599	67,333	4,764,811
Asbestic*.....	22,471	65,917	20,956	57,602	25,428	141,419
Total.....	159,236	10,975,369	199,573	14,792,201	92,761	4,906,230
Imports.....		656,037		1,047,031		575,153
Exports—						
Asbestos.....	119,122	9,625,695	152,740	11,521,536	63,340	5,465,311
Sand and waste.....	25,306	260,775	36,303	365,920	22,054	215,961
Manufactures.....		232,501		196,067		261,274
Total.....		10,118,971		12,083,523		5,942,546

*Includes "floats" in 1921.

BARYTES

The shipments of ground barytes in Canada during 1921 amounted to 270 tons valued at \$9,567, as against 751 tons at \$22,983 for the previous year, and were made from the mill operated by the Brandram-Henderson, Ltd., in connection with the barytes deposit leased by them at Lake Ainslie, Inverness County, Nova Scotia.

The total quantity of barytes mined during the year was 425 tons, of which amount, Nova Scotia contributed 225 tons and Ontario, the balance. The Ontario output was from a deposit located in North Burgess Township, owned by Mr. H. C. Bellew (now known as the Bellew Barytes Mines, Limited). No shipments were made from the Ontario deposit. The following table shows the production and imports of barytes and barium compounds over a period of three years.

Production and Imports of Barytes in Canada, 1919, 1920 and 1921

TABLE 123

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Nova Scotia.....	468	8,154	751	22,983	270	9,567
<i>Imports—</i>						
Barium peroxide.....	52	23,788	83	40,986	54	26,901
Blanc fixe and satin white.....	3,718	114,732	2,429	102,198	1,418	61,624
Barytes.....	(a)1,585	34,441	2,998	74,314	1,439	40,374

(a) Not separately classified previous to April, 1919.

CHROMITE

Shipments of chrome concentrates during 1921 amounted to 2,798 tons, valued at \$55,696, as compared with 11,016 tons at \$251,379 for 1920, a decrease of 15 per cent in quantity and 22 per cent in value. The average value obtained during the year was \$19.90 per ton, or appreciably less than the average return in the previous year of \$22.82 a ton.

The mine owned by the J. V. Belanger Mining Company in Coleraine township closed down early in the year after operating for a few months. In June this mine was reopened by the Union Chrome Mining Company, which firm carried on operations for some time. In November, this property was purchased by the United States Ferro-Alloys Corporation at a sheriff's sale.

Minor shipments were made during the year from stock by the Mutual Chemical Company of Canada, Limited, and the Black Lake Asbestos and Chrome Company. In 1918 some shipments of chromite were made from the Mastadon claim in the Grand Forks Division, British Columbia, but since that date this property has not been operated.

Production, Imports and Exports of Chromite, 1919, 1920 and 1921

TABLE 124

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Quebec.....	8,541	228,898	11,016	251,379	2,798	55,696
<i>Imports—</i>						
Bichromate of soda.....	502	113,478	679	267,235	318	59,557
Bichromate of potash.....	29	19,525	8	5,650	32	9,070
<i>Exports.....</i>	9,078	198,733	8,431	151,456	2,387	32,747

COAL

In another bulletin entitled "*Coal Statistics for Canada*," much more complete data on coal are given, but the following abstracts are included as of general interest.

The output of coal from Canadian mines during the twelve months ending December, 1921, amounted to fifteen million short tons valued at \$72,451,656 or \$4.81 per ton. This quantity was 88 per cent of the amount mined during the preceding year, when the total output was 16.9 million tons. In 1919 a total of 13.9 million tons of coal was raised so that although the output of 1921 was 12 per cent lower than in the preceding year, it was more than a million tons in excess of the 1919 production. The highest monthly output recorded was for November when more than 1.5 million tons was mined; the lowest was in April, the total for the month being half a million tons less, or 932,747 tons.

Alberta held the premier position among the coal-producing provinces, with an output of 5.9 million tons. Nova Scotia followed closely with 5.7 million tons. The output of coal from the mines of British Columbia amounted to 2.8 million tons, while Saskatchewan mined 335,632 tons, and New Brunswick 187,192 tons.

An analysis of the disposition of coal during the year shows that 57 per cent was shipped; 23.72 per cent went to railroads for locomotive consumption; 7.43 per cent was used about the colliery for power purposes; 5.95 per cent was sold for ships' bunkers; 1.10 per cent was put on bank; 2.30 per cent was put on the waste dump; 1.5 per cent was supplied to employees for domestic consumption; 0.6 per cent was used in the manufacture of coke at the collieries; 0.3 per cent was used in making briquettes. Included in quantities referred to in the disposition was 197,604 tons, lifted from bank during the year.

Output and Disposition of Coal from Canadian Mines in 1921

TABLE 125

	Per cent of Total	Total	Total Value	Average Value per ton
		Tons	\$	\$
Supplied to employees for domestic consumption.	1.56	237,624	647,134	2.72
Used for power purposes (colliery boilers, company's railroads, etc.).....	7.43	1,133,668	3,795,151	3.35
Ships' bunkers and railroads—				
(a) Ship's bunkers.....	5.95	907,425	5,317,934	5.86
(b) Railroads.....	23.72	3,619,197	18,654,057	5.15
Shipments of coal.....	57.00	8,695,400	43,187,849	4.97
Used in making coke at colliery.....	0.63	95,923	*495,919	5.17
Used in making briquettes.....	0.31	47,240	114,597	2.43
Put on bank.....	1.10	168,392	807,411	4.79
Put on waste heap.....	2.30	350,228	94,219	.27
Total disposition.....	100.00	15,255,097	73,114,274	4.79
Lifted from bank.....		197,604	662,618	3.35
Total output.....		15,057,493	72,451,656	4.8

*Value of coke manufactured.

In computing the values recorded in the preceding table the actual income from coal sold or shipped has been given. This value has in all cases been exclusive of delivery charges and has been based on the value obtained f.o.b. The value for the other items have been computed, for the various amounts given, at the same rate as was obtained for similar products sold by the operator.

The output of coal in Canada during each of the past three years has also been compiled by kinds and provinces. For convenience of reference the output during 1920 has in each case been taken as 100 and the corresponding percentage or index number has been calculated for the other two years. These data are given in the table on the following page:—

Output of Coal for Canada by Kinds and Provinces, 1919, 1920 and 1921

TABLE 126

Provinces	1919		1920		1921	
	Short Tons	Index No.	Short Tons	Index No.	Short Tons	Index No.
NOVA SCOTIA—						
Bituminous.....	5,790,196	90	6,437,156	100	5,734,928	89
NEW BRUNSWICK—						
Bituminous.....	166,377	97	171,610	100	187,192	109
SASKATCHEWAN—						
Lignite.....	379,347	113	335,222	100	335,632	100
ALBERTA—						
Anthracite.....	85,579	67	127,513	100	96,964	76
Bituminous.....	2,285,957	67	3,419,147	100	2,867,833	84
Lignite.....	2,562,124	76	3,361,105	100	2,944,420	88
Total Alberta.....	4,933,660	71	6,907,765	100	5,909,217	86
BRITISH COLUMBIA—						
Bituminous.....	2,649,516	86	3,095,011	100	2,890,870	92
YUKON—						
Bituminous.....					233	
TOTAL DOMINION						
Anthracite.....	85,579	67	127,513	100	96,964	76
Bituminous.....	10,892,046	83	13,122,924	100	11,630,824	89
Lignite.....	2,941,471	80	3,696,327	100	3,280,552	89
Grand total.....	13,919,096	82	16,946,764	100	15,057,493	88

In the period under review Canada exported nearly two million tons of coal or a little more than 13 per cent of the quantity actually mined. The amount exported was only 78 per cent of the total shipped for foreign trade in 1920, and even fell slightly below the amount exported in 1919.

Reference to the tables of exports herewith shows that more than 1.1 million tons of coal was exported through British Columbia ports during 1921. This was only one per cent less than in the previous year. It is to be remembered that these data do not show the province of origin but only the port of exit to the United States, and as the bulk of coal exported from Alberta is shipped through the Customs ports of Fernie and Cranbrook, it will be understood that the total exported coal credited to British Columbia ports was not all mined within that province. In the final report on coal statistics, the quantities shipped for export trade from the mines of each province are shown. A total of 727,787 tons was exported through Nova Scotia ports and about 71,698 tons through New Brunswick ports. Exports from the other provinces of Canada were negligible. The total exports of Canadian coal have been compiled in Table 127, to show the quantities exported from each of the provinces of Canada during the past three calendar years. For convenience of reference as before the quantities have been reduced to percentages of the 1920 exports so that the reader may note the rise or fall of exports from each province in relation to the exports from that province in 1919 and 1921.

Exports of Canadian Coal by Provinces, 1919, 1920 and 1921

TABLE 127

Provinces	1919		1920		1921	
	Short Tons	Index No.	Short Tons	Index No.	Short Tons	Index No.
Nova Scotia.....	994,107	80	1,245,673	100	727,787	58
New Brunswick.....	59,090	52	113,050	100	71,698	63
Prince Edward Island.....			2	100	2	100
Quebec.....	929	68	1,372	100	85	6
Ontario.....	5				10	
Manitoba.....	167	23	721	100	1,690	234
Saskatchewan.....	389	12	3,132	100	2,633	84
Alberta.....	1,022	33	3,106	100	843	27
British Columbia and Yukon.....	1,014,341	85	1,191,167	100	1,182,528	99
Total.....	2,070,050	81	2,558,223	100	1,987,276	78

Imports of Coal into Canada by Kinds and Provinces, 1919, 1920 and 1921

TABLE 128

Provinces	1919		1920		1921	
	Short Tons	Index No.	Short Tons	Index No.	Short Tons	Index No.
NOVA SCOTIA—						
Anthracite.....	60,095	133	45,334	100	62,245	137
Bituminous.....	4,076	134	3,044	100	1,875	62
Total.....	64,171	133	48,378	100	64,120	133
NEW BRUNSWICK—						
Anthracite.....	66,898	116	57,859	100	82,509	143
Bituminous.....	11,751	1,255	936	100	41,950	4,482
Total.....	78,649	134	58,795	100	124,459	212
PRINCE EDWARD ISLAND—						
Anthracite.....	9,574	173	5,544	100	6,643	120
Bituminous.....	142	28	513	100	238	46
Total.....	9,716	160	6,057	100	6,881	114
QUEBEC—						
Anthracite.....	1,378,460	89	1,544,456	100	1,311,712	85
Bituminous.....	2,673,819	76	3,503,410	100	2,684,566	77
Total.....	4,052,279	80	5,047,866	100	3,996,278	79
CENTRAL ONTARIO—						
Anthracite.....	2,978,472	101	2,945,782	100	2,809,327	95
Bituminous.....	7,700,935	74	10,373,324	100	8,733,828	84
Total.....	10,679,407	80	13,319,106	100	11,543,155	87
HEAD OF LAKES—						
Anthracite.....	465,676	157	295,682	100	260,890	88
Bituminous.....	1,547,784	79	1,963,579	100	1,975,918	101
Total.....	2,013,460	89	2,259,261	100	2,236,808	99
MANITOBA—						
Anthracite.....	12,906	74	17,509	100	33,473	191
Bituminous.....	62,746	144	43,547	100	76,833	176
Total.....	75,652	124	61,056	100	110,306	181
MANITOBA AND HEAD OF LAKES—						
Anthracite.....	478,582	153	313,191	100	294,363	94
Bituminous.....	1,610,530	80	2,007,116	100	2,052,751	102
Total.....	2,089,112	90	2,320,307	100	2,347,114	101
SASKATCHEWAN—						
Anthracite.....			206	100	254	123
Bituminous.....	1,406	263	535	100	2,127	398
Total.....	1,406	190	741	100	2,381	312
ALBERTA—						
Anthracite.....	66	13	517	100	66	13
Bituminous.....	1,131	186	607	100	1,829	301
Total.....	1,197	106	1,124	100	1,895	169
BRITISH COLUMBIA AND YUKON—						
Anthracite.....	136	181	75	100	251	335
Bituminous.....	6,700	51	13,137	100	17,086	130
Total.....	6,836	52	13,212	100	17,337	131
CANADA—						
Anthracite.....	4,972,283	101	4,912,964	100	4,567,370	93
Bituminous.....	12,010,490	76	15,902,632	100	13,536,250	85
Total.....	16,982,773	83	20,815,596	100	18,103,620	87

Total Output of Coal from Canadian Mines, 1919, 1920 and 1921

TABLE 129

Months	1919		1920		1921	
	Short Tons	Index No.	Short Tons	Index No.	Short Tons	Index No.
January.....	1,337,852	83	1,606,238	100	1,372,734	85
February.....	1,136,188	87	1,308,221	100	1,214,839	93
March.....	1,261,524	96	1,309,376	100	1,142,581	87
April.....	1,044,288	88	1,189,856	100	932,747	78
May.....	951,957	81	1,170,074	100	992,901	85
June.....	623,723	46	1,351,708	100	1,106,932	82
July.....	686,450	52	1,326,360	100	1,170,067	88
August.....	830,165	60	1,372,601	100	1,519,025	111
September.....	1,278,390	88	1,449,205	100	1,321,214	91
October.....	1,566,472	111	1,414,227	100	1,407,944	100
November.....	1,573,826	90	1,748,109	100	1,522,027	87
December.....	1,628,261	96	1,700,864	100	1,354,482	80
Total.....	13,919,096	82	16,946,839	100	15,057,493	89

Total Exports of Canadian Coal, 1919, 1920 and 1921

TABLE 130

Months	1919		1920		1921	
	Short Tons	Index No.	Short Tons	Index No.	Short Tons	Index No.
January.....	465,568	140	332,763	100	185,297	56
February.....	84,686	58	145,004	100	86,503	60
March.....	129,614	51	252,189	100	177,209	70
April.....	53,956	45	118,592	100	79,014	67
May.....	108,211	55	195,494	100	131,650	67
June.....	106,460	45	234,915	100	209,331	89
July.....	82,103	63	123,801	100	239,199	223
August.....	103,610	25	422,021	100	225,301	53
September.....	186,227	94	198,651	100	149,845	75
October.....	243,591	121	201,655	100	179,157	89
November.....	267,427	155	172,169	100	134,864	78
December.....	238,597	154	154,969	100	139,906	90
Total.....	2,070,050	81	2,558,223	100	1,987,276	78

Total Imports of Coal into Canada from the United States, 1919, 1920 and 1921

TABLE 131

Months	1919		1920		1921	
	Short Tons	Index No.	Short Tons	Index No.	Short Tons	Index No.
January.....	1,377,463	155	889,209	100	1,698,541	191
February.....	1,068,781	124	865,169	100	1,195,276	138
March.....	784,171	55	1,432,815	100	1,202,631	84
April.....	603,099	62	974,298	100	853,358	88
May.....	1,198,127	116	1,033,361	100	1,439,297	139
June.....	1,692,116	108	1,573,857	100	1,930,143	123
July.....	2,049,735	90	2,284,448	100	1,905,694	83
August.....	2,113,305	80	2,629,656	100	1,950,833	74
September.....	2,161,195	100	2,159,081	100	1,551,188	72
October.....	2,023,897	85	2,387,571	100	1,507,737	63
November.....	1,251,418	51	2,467,622	100	1,510,934	61
December.....	659,466	31	2,118,509	100	1,357,988	65
Total.....	16,982,773	82	20,815,596	100	18,103,620	87

Imports into Canada of Anthracite and Bituminous Coal from the United States, 1919, 1920 and 1921

TABLE 132

Months	1919		1920		1921	
	Short Tons	Index No.	Short Tons	Index No.	Short Tons	Index No.
<i>Anthracite—</i>						
January.....	399,686	111	359,427	100	328,853	91
February.....	347,866	118	294,903	100	307,671	104
March.....	170,754	39	440,222	100	384,373	87
April.....	209,958	80	263,077	100	274,502	104
May.....	461,701	136	338,321	100	458,841	136
June.....	430,812	91	472,157	100	506,592	107
July.....	537,059	96	561,981	100	488,904	87
August.....	586,570	98	596,555	100	419,805	70
September.....	562,851	151	371,626	100	351,500	95
October.....	446,281	106	419,224	100	323,861	77
November.....	377,531	90	419,266	100	336,863	80
December.....	441,214	117	376,205	100	385,605	102
Total Anthracite.....	4,972,283	101	4,912,964	100	4,567,370	93
<i>Bituminous—</i>						
January.....	977,777	185	529,782	100	1,369,688	259
February.....	720,915	126	570,266	100	887,605	156
March.....	613,417	62	992,593	100	818,258	82
April.....	393,141	55	711,221	100	578,856	81
May.....	736,426	106	695,040	100	980,456	141
June.....	1,261,304	114	1,101,700	100	1,423,551	129
July.....	1,512,676	88	1,722,467	100	1,416,790	82
August.....	1,526,735	75	2,033,101	100	1,531,028	75
September.....	1,598,344	89	1,787,455	100	1,199,688	67
October.....	1,577,616	80	1,968,347	100	1,183,876	60
November.....	873,887	43	2,048,356	100	1,174,071	57
December.....	218,252	13	1,742,304	100	972,383	56
Total Bituminous.....	12,010,490	76	15,902,632	100	13,536,250	85

In table 133, entitled "*Coal Made Available for Consumption in Canada*," the total quantities of coal mined in each month have been added to the total quantities imported as shown on the records supplied by the Department of Customs. From this aggregate there has been deducted the quantity of coal exported through the ports of Canada during the month. The quantity remaining, while not absolutely equivalent to the quantity of coal made available for consumption during each of the months reported, is an approximation which as nearly corresponds to the actual coal made available as it is possible to obtain. Reference to table 133 will show that the quantity for the months of the period varied from 70 per cent of the amount available during the same month of the preceding year to 133 per cent, and that the total coal supply for the year 1921 was 89 per cent of that available at the end of December, 1920, but was in excess of the coal supply at the end of 1919.

Coal Made Available for Consumption in Canada, by Months, 1919, 1920 and 1921

TABLE 133

Months	1919		1920		1921	
	Short Tons	Index No.	Short Tons	Index No.	Short Tons	Index No.
January.....	2,249,747	104	2,162,684	100	2,885,978	133
February.....	2,120,283	105	2,028,386	100	2,323,612	114
March.....	1,916,081	77	2,490,002	100	2,168,003	87
April.....	1,593,431	78	2,045,562	100	1,707,091	83
May.....	2,041,873	102	2,007,941	100	2,300,548	114
June.....	2,209,379	82	2,690,650	100	2,827,744	105
July.....	2,654,082	76	3,481,007	100	2,786,562	80
August.....	2,859,860	79	3,580,236	100	3,244,557	91
September.....	3,253,358	95	3,409,635	100	2,722,557	80
October.....	3,346,778	93	3,600,143	100	2,736,524	76
November.....	2,557,817	63	4,043,562	100	2,898,097	72
December.....	2,049,130	56	3,664,404	100	2,572,564	70
Total.....	28,831,819	82	35,204,212	100	31,173,837	89

FELDSPAR

Shipments of feldspar during 1921 were slightly less than those of the previous year, amounting to 29,868 tons valued at \$230,637. Sales during 1920 totalled 37,873 tons with a value of \$280,895. Ontario deposits, in the counties of Frontenac and Hastings contributed 20,115 tons, or approximately two-thirds of the tonnage shipped. The production of feldspar from Ottawa and Labelle counties in Quebec, was greatly increased over the output of the preceding year and the shipments amounted to 9,737 tons in 1921 as against 649 tons in 1920. A deposit of orthoclase feldspar was located in 1920 near Beach Hill Settlement, Halifax County, Nova Scotia and a trial shipment of some 16 tons was made during the period under review.

The total quantity of spar mined during the year was 35,678 tons, comprising 23,625 tons in Ontario, 11,853 tons in Quebec, and 200 tons in Nova Scotia.

The grinding plant at Ashbridges Bay owned by the Feldspar Milling Company of Toronto, was operated throughout the year. The capacity of this plant is about 6,000 tons per annum. A new plant with a capacity of 1,500 tons a year was completed by the Frontenac Floor and Wall Tile Company at Kingston, Ontario, and made ready for operation by the close of the year.

The average selling value of crude spar during the year was \$7.30 per ton, or 12 cents less than in 1920. Crushed spar brought \$10.60 per ton; Ground No. 1, \$21.50; and Dental, \$32.50.

The following table shows the production by provinces, together with the total imports and exports of this commodity during the last three years.

Production, Imports and Exports of Feldspar, 1919, 1920 and 1921

TABLE 134

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production (shipments)—</i>						
Nova Scotia.....					16	117
Quebec.....	925	13,073	649	10,052	9,737	80,180
Ontario.....	13,754	73,158	37,224	270,843	20,115	150,457
Total.....	14,679	86,231	37,873	280,895	29,868	230,754
<i>Imports.....</i>	(a) 980	15,863	1,991	44,390	1,050	25,120
<i>Exports.....</i>		104,285	38,768	219,744	27,293	169,864

(a) Last 9 months.

FLUORSPAR

The production of fluorspar in Canada in 1921 declined to less than half the amount recorded for 1920 and reached about the same level as in 1919. The total shipments during the year amounted to 5,539 tons valued at \$136,267. The principal producer was the Consolidated Mining and Smelting Company, which operated the Rock Candy Mine at Archibald, near Grand Forks, B.C. At this mine a total of 6,742 tons of fluorite ore was raised and 5,772 tons was milled in the decrepitation plant located at the mine. Rejects from the Rock Candy mill were retreated by flotation at Trail and during the year a total of 6,291 tons was handled in this way. From these two processes concentrates were produced. The shipments of concentrates from the mill amounted to 3,367 tons valued at \$82,811 or an average of \$24.50 a ton. The concentrates shipped from the flotation plant amounted to 1,909 tons and were valued at \$4,963, an average of \$26 a ton. The total shipments from Trail thus amounted to 5,276 tons. A small tonnage was also used for experimental purposes.

Ontario was the only other fluorite producing province, but no ore was mined during the year. Shipments amounting to 116 tons were made by two of the operators in the Madoc District, the value of these shipments being \$1,744, an average of about \$15 per ton.

In 1920 Ontario produced 3,750 tons out of a total of 11,235 tons, the balance being made up from the mines of British Columbia. Thus it will be seen that the great drop in the production of fluorspar in Canada during the past year was very largely due to the absence of production in Ontario as the shipments from British Columbia amounted to over 5,000 tons as compared with a total of about 7,400 tons in the preceding year. The decline in Ontario was due mostly to the diminished demand for fluorite as a flux in steel furnace work. The principal statistics relating to the production and trade in fluorspar are given in the following table.

Production, Imports and Exports of Fluorspar, 1919, 1920 and 1921

TABLE 135

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Ontario.....	3,425	59,281	3,758	68,475	116	1,744
British Columbia.....	1,638	38,556	7,477	171,971	5,403	134,523
	5,063	97,837	11,235	240,446	5,539	136,267
<i>Imports—</i>						
Hydro-fluo-silicic acid.....	2.8	747	1.2	409	1.05	212
Fluorspar.....	(a) 8,273	84,702	6,812	113,818	3,867	43,752
<i>Exports.....</i>	(a) 697	9,616	6,900	109,683	4,625	51,470

(a) Last 9 months.

GRAPHITE

Natural Graphite.—The production of graphite in Canada during 1921 was practically negligible, the entire mine output being 1,500 tons, all of which was raised from the Black Donald mine at Whitefish Lake, fourteen miles west of Calabogie, Ontario. The total shipments from all graphite properties in Canada during the year amounted to 937 tons valued at \$65,862. These shipments consisted of 149 tons No. 1 and No. 2 flake, valued at \$29,187, and 788 tons No. 3 flake and dust, valued at \$36,675.

The Black Donald Graphite Company, Ltd., and the Quebec Graphite Company, were the only firms that reported shipments for the year. None was mined by the latter company, shipments being made from stock. At the close of the year stocks aggregating 700 tons remained unsold at the mines.

During the year a new firm "The Standard Graphite Company" commenced development work on its property located on lots 29, 30 and 31, Range VI of the township of Boyer, a few miles from Guénette Station on the C.P.R. line to Mont Laurier. The ore is high-grade, and will be treated in the mill, the construction of which was commenced during 1921. This mill will be operated by water power developed on the property.

The collapse of the graphite industry in Canada was but a reflection of the conditions prevailing in this industry throughout the world, for probably never before in the history of the industry were conditions so deplorable. The demand for crucible steel for war purposes created an unusual demand for graphite crucibles and many new graphite mines were developed in all parts of the world. At the close of the war many steel manufacturers had large supplies of crucibles on hand, manufacturers were carrying excessive stocks, and graphite producing companies found themselves with supplies of refined and crude graphite sufficient to meet even the inflated needs of war-time for months and in some cases, years. The surplus has not yet been exhausted, and as a consequence no demand has developed.

Production, Imports and Exports of Graphite, 1919, 1920 and 1921

TABLE 136

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Ore milled.....	7,076	.....	5,153	.....	1,500	.....
Output, milled graphite.....	1,648	.....	2,155	.....		.....
<i>Production (shipments)—</i>						
No. 1 Flake.....	95	22,100	196	40,382	149	29,187
No. 2 Flake.....	103	14,853	225	28,572		
No. 3 Flake and Dust.....	1,162	63,268	1,769	96,663	788	36,675
	1,360	100,221	2,190	165,617	937	65,862
<i>Imports—</i>						
Crucibles, plumbago.....	(a)	36,717		90,092		23,786
Plumbago not ground or otherwise manufactured.....		196,604		4,352		4,141
Plumbago ground and manufactures of, n.o.p.....		80,970		102,568		47,463
<i>Exports—</i>						
Graphite or plumbago, crude or refined	1,003	72,917	2,142	159,817	614	40,809

(a) Nine months only.

Artificial Graphite.—Artificial graphite is manufactured in electric furnaces at Niagara Falls, Ontario, by the Acheson Graphite Company. The annual production over a period of fifteen years is shown in the following table:

Artificial Graphite Made in Canada, 1907-1921

TABLE 137

Calendar Year	Pounds	Calendar Year	Pounds	Calendar Year	Pounds
1907.....	407,779	1912.....	2,302,625	1917.....	1,096,172
1908.....	428,540	1913.....	2,184,472	1918.....	1,808,698
1909.....	513,436	1914.....	1,234,239	1919.....	358,524
1910.....	2,442,166	1915.....	497,271	1920.....	207,180
1911.....	2,172,098	1916.....	525,048	1921.....	376,508

GYPSUM

The output of gypsum rock during 1921 was 434,545 tons as against 460,020 tons in 1920. By provinces, the quantity quarried was: Nova Scotia, 241,657 tons; New Brunswick, 62,021 tons; Ontario, 82,057 tons; Manitoba, 48,770 tons; and British Columbia, 40 tons. Of this quantity 121,878 tons, or 28 per cent, was calcined during the period. Shipments of all grades amounted to 386,550 tons, valued at \$1,785,538, while sales reported for the previous year were 429,144 tons, at \$1,893,991. Average values, per ton for the different grades were as follows: lump, \$1.78; crushed, \$2.56; fine ground, \$3.42; and calcined, \$10.61.

Importations of crude, ground and calcined gypsum during the year totalled 5,628 tons, valued at \$76,055. Exports during the same period amounted to 234,520 tons, consisting of 230,011 tons crude, and 4,509 tons of ground gypsum, with a total value of \$497,741.

Summary of Statistics on Gypsum in Canada, 1919, 1920 and 1921

TABLE 138

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Ore, mined.....	303,998	.....	460,020	.....	434,545	.....
Ore, calcined.....	121,496	.....	148,864	.....	121,878	.....
<i>Production: by grades—</i>						
Lump.....	172,781	206,858	262,442	457,158	195,456	347,180
Crushed.....	27,939	68,002	48,379	146,947	66,893	171,567
Fine ground.....	3,842	18,901	6,615	46,584	7,020	24,029
Calcined.....	94,501	921,526	111,708	1,243,302	117,181	1,242,762
	299,063	1,215,287	429,144	1,893,991	386,550	1,785,538
<i>Production: by Provinces—</i>						
Nova Scotia.....	163,852	250,174	260,661	573,752	206,831	511,883
New Brunswick.....	42,409	315,656	49,405	428,183	54,030	360,220
Ontario.....	59,899	278,120	74,707	404,162	84,790	433,053
Manitoba.....	32,903	371,337	44,371	487,894	40,859	480,282
British Columbia.....					40	100
<i>Exports—</i>						
Crude.....	148,394	199,857	244,428	413,522	230,011	417,502
Ground.....		140,235	12,576	232,736	4,509	80,239
		340,092		646,258	234,520	497,741
<i>Imports—</i>						
Crude.....	1,238	22,556	2,294	25,477	2,952	31,303
Ground.....	85	2,635	118	3,966	41	2,427
Plaster of Paris.....	1,525	22,204	2,822	48,859	2,635	42,325
	2,848	47,455	5,234	78,302	5,628	76,055

IRON OXIDES

Shipments of iron oxides during 1921 amounted to 9,048 tons, valued at \$93,610, as against 19,128 tons worth \$157,909 in the previous year. The sales comprised 6,969 tons crude and 2,079 tons ground and calcined. The average value of the former was \$2.99 per ton, while the latter sold for \$35 a ton.

In addition to the usual production of oxides from the bog iron ore deposits in the province of Quebec, a trial shipment was made to the United States by a small operator in British Columbia.

The crude oxide was used for the purification of illuminating gas and the calcined product was consumed entirely in the paint industry.

Production, Imports and Exports of Iron Oxides, 1919, 1920 and 1921

TABLE 139

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
<i>Production</i>	11,862	\$ 113,427	19,128	\$ 157,909	9,048	\$ 93,610
<i>Imports</i> —						
Ochrey earths.....	1,297	65,744	3,231	182,997	1,217	61,576
Oxides.....	3,378	518,780	3,567	619,923	2,191	346,070
<i>Exports (a)</i>	767	25,229	1,528	78,913	1,491	66,631

(a) Mineral pigments, iron oxides and ochres.

MAGNESIUM SULPHATE

The production of magnesium sulphate or crude epsom salts in Canada during 1921 amounted to 2,029 tons, valued at \$39,506, comprising 1,412 tons crude and 617 tons refined. Shipments for the same period of 1920 were 1,947 tons, worth \$39,886. The total quantity extracted during the year was 1,428 tons, as against 2,056 tons in the previous twelve months.

Preliminary shipments were made in 1920 by the Basque Chemical Production Company, Limited, from several lakes, containing these salts, on the Basque ranch, near Ashcroft, B.C. This company continued operations during 1921, extracting and refining a considerable quantity. The Stewart-Calvert Company Inc. of Oroville, Washington, did not make any shipments of magnesium sulphate from their deposits in British Columbia. In the previous year this firm made some shipments from its property near Clinton, Lillooet, B.C.

The crude magnesium sulphate was sold for use principally in the tanning industry, although the textile industries used considerable quantities, and the manufacturers of dyes also purchased small quantities. A small amount of the C. P. product was also sold to local dealers. The value of the products shipped varied according to the grades, that sold to the tanning industry being quoted at \$28 per ton, while the C. P. product was listed at \$94.60 per ton. Although some of the product was sold locally, shipments were also made to points in the United States and as far east in Canada as Ontario and Quebec.

Production, Imports and Exports of Magnesium Sulphate, 1919, 1920 and 1921

TABLE 140

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
<i>Production</i> —		\$		\$		\$
Crude.....	738	9,115	1,947	39,886	1,412	18,425
Refined.....					617	21,081
<i>Imports</i>		54,779		72,709		29,987
<i>Exports</i>		15	743	3,737	120	4,562

MAGNESITE

Magnesite was another industry in which there was a great decline in production during 1921. While shipments in 1920 amounted to 18,378 tons, valued at \$512,756, the quantity marketed during 1921 was only 3,730 tons, having a total valuation of \$81,320.

The average value obtained per ton of magnesite sold, by grades, was: crude, \$8.98; calcined, \$25.15; and dead-burned, \$35.75. During 1920, the prevailing prices were, crude, \$9.26; calcined, \$20.42; and dead-burned, \$37.40.

As in previous years, the bulk of the production of magnesite came from deposits in Argenteuil county, Quebec. One firm in British Columbia reported sales amounting to nearly 1,000 tons for the year. The North American Magnesite Producers, Limited, the Scottish Canadian Magnesite Company, Limited, and the International Magnesite Company, Limited, were as usual the only Quebec producers.

Dead-burned magnesite is consumed entirely in the metallurgical industry as a refractory lining for furnaces. Calcined magnesite is used as a plastic material for floors and walls in buildings and also in the manufacture of pipe and furnace coverings.

Quebec magnesite has been used principally in the clinkered form by steel works, but owing to the depression in this industry the demand has been slight. Under the name of "Firestone Stucco," calcined magnesite has been introduced as a building material. Development work has been carried on and some shipments of the finished product have been made.

The following table shows the production, imports and exports of magnesite during the past three years.

Production, Imports and Exports of Magnesite, 1919, 1920 and 1921

TABLE 141

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Crude, mined.....	14,952		31,040		9,311	
Crude, calcined.....	12,214		30,230		4,648	
<i>Production—</i>						
Crude.....	1,638	14,664	4,296	39,779	1,673	15,024
Calcined.....			3,154	64,402	684	17,200
Dead burned.....	9,635	313,801	10,928	408,575	1,373	49,096
	11,273	328,465	18,378	512,756	3,730	81,320
<i>Imports—</i>						
Magnesia.....	183	61,740	287	84,339	220	87,530
Magnesite.....	(a) 886	21,734	1,521	49,799	185	8,000
Magnesite firebrick.....		120,189		446,445		61,728
<i>Exports—</i>						
Crude.....		425,892	155	1,662		5
Calcined.....			10,859	425,048	1,351	63,603

(a) Last nine months.

MANGANESE

The entire Canadian production of manganese ore during 1921 came from the deposits at New Ross, Lunenburg County, Nova Scotia. The total shipments reported were 68 tons valued at \$3,400, as against 649 tons worth \$11,029 for 1920. No operations were carried on either at the deposits near Kaslo, B.C., or at the Hill 60 group of claims near Cowichan Lake, Vancouver Island. In former years shipments were made from these properties to the Bilrowe Alloys Company of Tacoma, Washington, U. S. A.

The manganese ores mined in Eastern Canada are pyrolusite, manganite, psilomelane and bog manganese. These are mostly ores with a high manganese content and are fairly free from deleterious constituents.

Manganese is used extensively by steel manufacturers, as it possesses the property of forming alloys with a large number of metals, producing a product of great tensile strength. Manganese compounds are also used extensively in the manufacture of chlorine, bromine, manganates and permanganates; as a decolourizer of glass, porcelain and enamels; as a colouring material in dyeing, pottery and paint manufacture; as a drier in paints and varnishes; and as a depolarizer in dry batteries.

The method used in determining the price of manganese by United States purchasers is quoted from the *Engineering and Mining Journal-Press*, as follows:

"The unit price is based on 100 per cent or 100 parts. In a long or gross ton there are 2,240 pounds, and there would then be 22.40 pounds to the unit. If the schedule calls for a price of \$1 per unit, and the analysis shows 35 per cent manganese, the value of the ore would be \$35 per ton. Premiums would be added to this or penalties deducted from it. If, however, the ore was sold by the pound and the price was the same per unit, the price per pound would be 4.42 cents, or 100 divided by 22.40."

Production, Imports and Exports of Manganese Ore, 1919, 1920 and 1921

TABLE 142

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Nova Scotia.....	45	3,600	62	4,140	68	3,400
British Columbia.....	616	10,559	587	6,889	.....	.....
	661	14,159	649	11,029	68	3,400
<i>Imports—</i>						
Manganese oxide.....	2,082	89,314	1,510	93,062	636	47,159
Ferro-silicon, spiegeleisen and ferro-manganese.....	4,383	901,678	7,908	1,324,061	2,294	295,420
<i>Exports—</i>						
Manganese ore.....	603	13,401	640	19,921	28	2,240
Ferro-silicon and compounds.....	22,449	1,229,341	25,422	1,297,720	10,031	504,842

MICA

Operations in the mica industry were considerably curtailed in 1921. Only some 1,173 tons were mined, of which quantity Quebec contributed 1,015 tons and the province of Ontario the balance, 158 tons.

Shipments of mica reported for same period amounted to approximately 702 tons, a decrease of 68 per cent, when compared with sales for the previous twelve months.

It will be noted that the stated value of the exports of Canadian mica exceeded by a considerable amount the value placed on shipments reported by operators. An explanation of this lies in the fact that the exportations consisted principally of mica splittings, shipped from large trimming shops, situated in Ontario and Quebec, while most of the shipments by the mines were of mica in its rough-cobbed form.

The following table shows the shipments of mica by classes and the total value f.o.b. shipping point, together with the average price per pound.

Mica Shipments by Grades in Canada, 1921

TABLE 143

Grade	Pounds	Value f. o. b. shipping point	Price per pound
		\$	\$ cts.
Rough cobbled.....	329,010	31,920	.10
Ground mica.....	20,000	15	.08
Thumb-trimmed—			
1 × 1 inches.....	21,252	2,857	.13
1 × 2 “.....	7,683	1,718	.22
1 × 3 “.....	8,064	2,438	.30
2 × 3 “.....	4,207	2,115	.50
2 × 4 “.....	4,891	4,544	.92
3 × 5 “.....	1,488	2,264	1.52
4 × 6 “.....	655	1,240	1.89
Splittings only.....	20,350	15,365	0.76
Scrap.....	986,230	5,282	0.005
Pattern.....	277	305	1.10
Total.....	1,404,107	70,063	0.05

Production and Exports of Mica for Canada, 1919, 1920 and 1921

TABLE 144

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Quebec.....	2,429	218,437	737	281,460	484	41,172
Ontario.....	325	55,351	1,486	94,562	218	28,891
	2,754	273,788	2,203	376,022	702	70,063
<i>Exports—</i>						
Mica, total.....	(a) 100	100,942				
Cobbled.....	(b) 108	214,227	42	55,724	12	12,942
Splittings.....	(b) 350	314,238	522	725,946	185	195,479
Scrap and waste.....	(b) 2,182	11,959	2,739	33,963	967	12,061
Plate and manufactures.....	(b)	596		8,474		4,201
		641,962		824,107		224,683

(a) First 3 months. (Total Mica.)

(b) Last 9 months.

MINERAL WATER

Mineral water produced in Canada during 1921 was valued at \$21,569, as compared with the total valuation of \$24,582 for 1920. Mineral springs in Ontario and Quebec contributed the total Canadian production.

In the present compilation, there has been included a record of all known shipments of natural mineral waters sold to the general public for medicinal purposes. No record has been kept of the shipments made of ordinary spring waters.

The values given do not take into account any mineral water used at the springs for drinking or bathing purposes but include only the shipments from the springs in bottles or other containers.

The following table shows the production, imports and exports of mineral water over a period of three years:

Production, Imports and Exports of Mineral Water, 1919, 1920 and 1921

TABLE 145

	1919	1920	1921	
	Value	Value	Imp. Gals.	Value
	\$	\$		\$
<i>Production, by provinces—</i>				
Quebec.....	13,257	10,109	19,626	7,278
Ontario.....	55,958	14,473	308,647	14,438
British Columbia.....	1,800			
Total.....	71,015	24,582	328,273	21,716
<i>Imports.....</i>	113,743	178,220		128,229
<i>Exports.....</i>	59,669	12,796		44,022

NATRO-ALUNITE

A small quantity of natro-alunite was mined during 1921 from a deposit located at Kyuquot Sound, on the west coast of Vancouver island, B.C. This ore was treated in the mill situated at Esquimalt, near Victoria, operated by the San Juan Mining and Manufacturing Company, Limited. The resultant product, calcined alunite, was used as a fertilizer, for its potash content. Sales for the year amounted to 30 tons, valued at approximately \$1,500.

NATURAL GAS

Natural gas produced in Canada during 1921, amounted to 14,077,601 thousand cubic feet. Ontario continued to be the leading producer of this commodity contributing 8,422,774 thousand cubic feet. The year's production showed a decrease of 2,767,917 thousand cubic feet or 16 per cent from the 1920 output.

While the value given in the following table for the output of natural gas in Ontario represents the sum of the values reported by the producers, the actual selling price of this gas to the consumers was at a considerably higher rate; the estimated retail value of the output was \$3,790,248, or an average of about 45 cents per M cu. ft. The retail price of natural gas in Ontario in 1921 ranged from 15 cents in the gas fields to 80 cents at the end of long transmission lines.

The Alberta production of 4,945,884 thousand cubic feet represented a decrease in quantity of some 687,558 thousand cubic feet or 12 per cent, but the value, \$1,374,599, showed an increase of \$193,254 or 16 per cent. In this province several large industrial concerns merely operated wells to supply their own demands, and in some instances therefore, a value for the product was not given, while in other cases only a nominal value was placed on the gas consumed. In order to obtain a value for this gas that would be comparable with the other records it was necessary to evaluate it at the average price paid by consumers throughout the province.

The production in the province of New Brunswick increased 26,241 thousand cubic feet or 3.8 per cent over the output for the previous year.

The following table shows the production of natural gas, by provinces, for the past three years.

Production of Natural Gas in Canada, 1919, 1920 and 1921

TABLE 146

	1919		1920		1921	
	M. cu. ft.	Value	M. cu. ft.	Value	M. cu. ft.	Value
		\$		\$		\$
<i>Production—</i>						
New Brunswick.....	682,890	120,510	682,502	130,506	708,743	139,375
Ontario.....	11,024,041	2,690,400	10,529,374	2,920,731	8,422,774	3,080,130
Alberta.....	8,230,838	1,365,127	5,633,442	1,181,345	4,945,884	1,374,599
Manitoba.....			200	60	200	60
Total.....	19,937,769	4,176,037	16,845,518	4,232,642	14,077,601	4,594,164

PEAT

The manufacture of peat in Canada was carried on during 1921 at the Alfred bog. Operations at this bog were of an experimental nature, conducted jointly by the Ontario and Federal Governments. During the year all efforts were concentrated towards the construction of a combination plant, which was expected to double the capacity of the former one.

The total quantity of peat produced during the year was 4,000 tons. Of this amount 1,666 tons valued at \$4 per ton was shipped. Practically the whole of the remainder was lost in a fire which occurred at the plant.

Production of Peat in Canada, 1919, 1920 and 1921

TABLE 147

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Production.....	986	6,561	4,550	18,650	1,666	6,664

PETROLEUM

Ontario, as usual, was the principal petroleum-producing province in Canada in 1921, the total output for the year amounting to 172,859 barrels valued at \$2.71 per barrel. The old Petrolia field showed a production of 68,484 barrels or 3,000 barrels in excess of the 1920 output. No new wells were drilled in this field during the year, and as the Petrolia field is now entering on its sixtieth year of production the increase was worthy of special mention.

The New Brunswick output amounted to 7,479 barrels valued at \$3.89 per barrel. Activities in this province were confined to the Stony Creek district in Albert county, where operations were carried on by the New Brunswick Gas and Oilfields, Limited.

The production in Alberta declined to 7,203 barrels or 3,829 barrels below the 1920 output, a drop of 35 per cent in quantity and value. The entire output was derived from the Turner Valley field, near Black Diamond.

In the Fort Norman area, Northwest Territories, drilling operations were continued during the year. Well No. 2, situated forty miles below Fort Norman, was reported as producing approximately 60 barrels per day.

Under the "Petroleum Bounty Act," Canadian producers continued to be paid a bounty of $1\frac{1}{2}$ cents per gallon on all oil marketed of a specific gravity above 0.8235. The administration of this act is under the supervision of the Department of Trade and Commerce. Owing to the light character of the crude petroleum produced in Alberta, the greater part of the output in this province does not earn the bounty.

For comparative purposes, tables are given below showing production, imports and exports of petroleum over a period of three years.

Crude Petroleum Production in Canada, by Provinces, 1919, 1920 and 1921

TABLE 148

	1919		1920		1921	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
Bounty paid.....		119,714		97,700		94,677
<i>Production:</i>						
New Brunswick.....	4,225	13,141	5,148	19,933	7,479	33,022
Ontario.....	219,804	625,342	180,071	726,286	172,859	559,198
Alberta.....	16,437	97,841	11,032	75,986	7,203	49,313
Total.....	240,466	736,324	196,251	822,235	187,541	641,533

Crude Petroleum Production by Fields in Ontario,* 1921

TABLE 149

Field	Quantity in Barrels	Value less Bounty	Bounty Paid	Total Value
		\$ cts.	\$ cts.	\$ cts.
Petrolia and Enniskillen.....	68,483 32/35	185,591 40	35,954 09	221,545 49
Oil Springs.....	40,966 22/35	111,019 57	21,507 31	132,526 88
Moore Township.....	7,536 4/35	20,422 86	3,956 47	24,379 33
Sarnia Township.....	4,068 20/35	11,025 82	2,135 96	13,161 78
Plympton Township.....	480 21/35	1,302 43	252 30	1,554 73
Bothwell.....	26,877 1/35	72,836 75	14,110 46	86,947 21
Tilbury East.....	1,002 20/35	2,716 96	526 35	3,243 31
West Dover.....	7,473 10/35	20,252 62	3,923 46	24,176 08
Raleigh Township.....	3,320 13/35	8,998 21	1,743 20	10,741 41
Dutton.....				
Onondaga.....	566 6/35	1,534 32	297 24	1,831 56
Belle River.....				
Moza Township.....	10,764 3/35	29,170 69	5,651 16	34,821 85
Thamesville.....	1,319 20/35	3,576 03	692 78	4,268 81
Total.....	172,858 32/35	468,447 66	90,750 78	559,198 44

*Supplied by the Supervisor of Crude Petroleum Bounties, Petrolia, Ont.

PETROLEUM REFINERY STATISTICS.—As a matter of interest there has been tabulated a record of the crude petroleum and other materials used in the oil refineries of Canada during the past two years and a list showing the quantities and values of the refined products made.

Materials Used and Products Made by the Oil Refineries of Canada, 1920-1921

TABLE 150

	1920		1921	
	Quantity	Value	Quantity	Value
<i>Materials used</i>		\$		\$
Crude oil, product of Canadian wells... Imp. gals.	6,711,070	835,870	5,899,881	503,714
Crude oil, imported.....	288,865,457	34,586,671	366,122,361	32,794,456
Sulphuric acid (66°Be) (Not made by firm reporting)..... Lb.	48,001,510	547,503	57,839,800	674,855
Sulphur (not used in acid manufacture)..... "	66,666	2,242	102,540	3,165
Caustic soda..... "	2,738,824	107,207	3,563,907	167,550
Litharge..... "	204,423	25,244	360,758	34,191
Clay..... "	251,065	3,812	223,432	3,123
Other materials.....		716,344		673,036
Total.....		36,824,893		34,854,090
<i>Products made</i>				
Gasoline..... Imp. gals.	86,193,664	28,272,902	119,204,263	30,806,355
Petroleum spirits..... "	2,447,489	577,028	2,037,319	426,993
Kerosene..... "	54,155,655	10,887,972	59,018,153	7,526,225
Fuel and gas oils..... "	96,462,792	10,342,946	129,114,124	6,551,056
Lubricating oils..... "	17,192,398	4,429,362	17,345,119	3,852,216
Grease..... Lb.	7,695,701	545,174	6,674,262	269,279
Tar..... "	14,424,634	94,073	18,971,400	142,285
Petroleum coke..... Tons	33,576	297,400	65,395	621,912
Wax and candles..... Lb.	10,398,127	973,805	10,777,994	310,267
Other products.....		1,256,014		757,690
Total.....		57,675,676		51,264,678

Imports into Canada, and Exports of Petroleum and its Products, 1919, 1920 and 1921

TABLE 151

	1919		1920		1921	
	Gals.	\$	Gals.	\$	Gals.	\$
Imports						
Crude petroleum in its natural state, .7900 specific gravity or heavier at 60 degrees temperature, when imported by oil refiners to be refined in their own factories.....	305,748,960	15,104,287	290,736,366	20,814,899	355,300,352	20,010,091
Crude petroleum, gas oils other than naphtha, benzine and gasoline lighter than .8235 but not less than .775 specific gravity at 60 degrees.....	155,145	23,866	178,641	28,869	222,241	18,737
Petroleum (not including crude petroleum imported to be refined, or illuminating or lubricating oils) .8235 specific gravity or heavier at 60 degrees temperature.....	99,559,068	4,702,771	122,750,650	7,790,137	61,176,430	3,796,977
Petroleum, imported by miners or mining companies or concerns, for use in the concentration of ores of metals in their own concentrating establishments.....	42,085	1,367	16,249	1,344	18,022	3,579
KEROSENE AND ILLUMINATING OILS						
Coal oil and kerosene, distilled, purified or refined.....	6,757,159	926,821	14,971,509	2,359,621	10,544,281	790,468
Illuminating oils, composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon.....	156,126	119,465	176,340	127,889	120,416	62,323
LUBRICATING OILS						
Lubricating oils, composed wholly or in part of petroleum, and costing less than 25 cents per gallon.....	1,496,809	289,442	881,102	175,478	2,032,361	374,596
Lubricating oils, n.o.p.....	3,480,183	1,467,593	4,376,192	2,267,611	3,008,095	1,559,965
OTHER OILS						
Gasoline under .725 specific gravity at 60 degrees temperature.....	4,391,607	1,142,855	8,515,545	2,404,488	21,101,146	4,665,200
Gasoline, n.o.p.....					19,163,561	2,946,258
All other oils, n.o.p.....	268,604	128,863	222,041	113,681	57,667	39,040
OTHER PRODUCTS OF PETROLEUM						
Grease, axle..... Lb.	3,927,278	357,495	8,408,394	803,848	3,289,526	296,971
Paraffine wax..... "	844,838	108,049	2,425,959	276,772	1,362,188	72,661
Paraffine wax candles..... "	541,626	111,707	538,285	124,764	201,906	45,729
Vaseline and all similar preparations of petroleum for toilet, medicinal or other purposes.....		327,715		386,127		219,886
Petroleum, products of, n.o.p..... Gals.	29,516,589	5,615,622	48,769,546	10,891,302	13,113,087	1,990,496
Total Petroleum and its Products, Imported.....		30,427,918		48,566,830		36,892,977
EXPORTS						
Oil, coal and kerosene, crude..... Gals.	603,748	40,648	2,684,427	293,325	5,384,751	375,820
Oil, coal and kerosene, refined..... "	2,846,293	287,170	1,243,335	205,999	1,466,422	209,282
Oil, gasoline and naphtha..... "	1,566,777	428,754	160,433	59,432	762,080	212,638
Oil, mineral, n.o.p..... "					105,499	31,279
Wax, mineral..... Cwt.	71,259	626,799	26,915	230,172	821	7,552
Total Petroleum and its Products, Exported.....		1,383,371		788,928		836,571

PHOSPHATE

The output of phosphate in Canada during 1921 was only 70 tons produced as a by-product in the mining of mica in the province of Quebec. Of this quantity 30 tons valued at \$450 was sold locally.

The value of phosphate rock imported, principally Florida phosphate, showed a considerable decrease, to an average of \$6.30 per ton, as against \$8.50 a ton for 1920 importations. The total tonnage imported was practically unchanged.

Production, Imports and Exports of Phosphate, 1919, 1920 and 1921

TABLE 152

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Quebec.....	22	300			30	450
Ontario.....	2	31				
	24	331			30	450
<i>Imports—</i>						
Phosphate rock.....		30,267	13,476	114,480	13,711	86,530
Acid phosphate (a).....	1,423	295,387	1,728	369,105	1,545	253,644
Phosphorus.....	24	19,928	43	49,699	25	24,380
Phosphor tin and bronze.....	62	61,647	124	120,720	105	103,804
Superphosphate.....		(b) 178,292		470,970		484,368
<i>Exports—</i> Phosphate rock.....	48	741	76	645		

(a) Probably refined phosphate of lime and phosphate of soda.

(b) Separately classified as from April 1, 1919; formerly included under manufactured fertilizers.

PYRITES

The production of pyrites (iron and copper) in Canada during 1921 decreased considerably from the quantity produced in 1920. By provinces, shipments for the year were: Quebec, 1,986 tons; Ontario, 27,785 tons; British Columbia, 3,597 tons; making a total of 33,368 tons for the Dominion.

The total sulphur content of the 1921 production was 12,213 tons; the percentage of sulphur varied from 33.6 per cent to 38 per cent, with an average of 36.6 per cent.

Small shipments of copper-pyritic ore were made from the Weedon mine in the Eastern Townships of Quebec. The producing companies in Ontario were: The Algoma Steel Corporation, Limited; Nichols Chemical Company, Limited (Sulphide and Northpines mines), and the Grasselli Chemical Company. The latter company made a small shipment from stock. The British Columbia producers were: the Consolidated Mining and Smelting Company of Canada Limited, and the Granby Consolidated Mining, Smelting and Power Company. The former company shipped from the Sullivan mine to the acid plant at Trail, and the latter firm's shipments were from the Hidden Creek mine at Anyox to the plant at Barnet, B.C.

Production, Imports and Exports of Pyrites, 1919, 1920 and 1921

TABLE 153

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Quebec.....	52,746	203,222	14,817	44,451	1,986	10,463
Ontario.....	117,011	285,832	148,652	618,283	27,785	101,306
British Columbia.....	6,730	33,650	11,275	56,376	3,597	4,557
	176,487	522,704	174,744	719,110	33,368	116,326
Sulphur content.....	65,674		67,608		12,213	
<i>Imports—</i>						
Brimstone or sulphur, crude or in roll or flour.....	56,062	1,015,223	144,733	2,113,713	78,762	1,272,619
<i>Exports.....</i>	89,089	388,508	119,136	458,403	7,875	31,500

Sulphuric Acid.—Eight firms manufactured sulphuric acid in Canada during 1921, a similar number as reported operations in the previous year.

Statistics have been collected giving the production of this commodity in terms of the standard grades of 50° Bé., 60° Bé and 66° Bé. For comparative purposes it has been deemed advisable to reduce the first two grades to their equivalent in 66° Bé., acid.

Production,* Imports and Exports of Sulphuric Acid, 1919, 1920 and 1921

TABLE 154

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Ore used—</i>						
Sulphur.....	2,245		13,534		10,863	237,460
Pyrites.....	54,879		44,398		19,844	143,778
<i>Production.....</i>	63,596		82,811		55,902	1,290,785
<i>Imports.....</i>	1,437	38,759	320	22,664	94	10,653
<i>Exports.....</i>	5,447	108,392	5,217	89,992	2,759	55,775

*Expressed in terms of 66° Bé acid. Record includes a small production of oleum and other grades, the strength of which is not specified. An approximate estimate of production in terms of 50° acid will be obtained by increasing these figures by 50 per cent.

QUARTZ

Shipments of quartz (silica) during 1921 amounted to 100,350 tons valued at \$312,947, as compared with 128,295 tons, worth \$467,821, for the previous year. Sales for the period comprised 68,390 tons of crude at \$2.78 per ton and 31,960 tons crushed product at \$3.88 a ton. The total quantity quarried during the year was 97,260 tons and the stock on hand at the end of the twelve months was 3,645 tons.

The quartz grinding plant at St. Canut, Quebec, owned by the Silico Limited, formerly the Cascades Silica Products Co., was operated throughout the year.

The principal companies operating during 1921, were Dominion Mines and Quarries, Limited; Granby Consolidated Mining, Smelting and Power Co., Limited; International Nickel Company of Canada, Limited; Mond Nickel Co., Limited, and Wright and Company.

Quartz is used in the smelting of nickel and copper ores, in the manufacture of ferro-silicon, glass, sanitary ware, silica brick, paints, scouring soaps, and abrasives.

Production and Imports of Quartz, 1919, 1920 and 1921

TABLE 155

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Quebec.....	2,221	7,773	1,986	5,558	5,994	29,824
Ontario.....	60,055	179,549	90,433	321,063	72,068	220,806
British Columbia.....	32,715	340,313	35,876	141,200	22,288	62,317
	94,991	527,635	128,295	467,821	100,350	312,947
<i>Imports—</i>						
Silex.....	641	13,825	1,154	26,097	1,211	36,041
Flint.....	5,411	100,902	9,047	170,355	5,061	84,761

SALT

Twelve firms reported production in the salt industry during 1921, ten of these being in Ontario, one in Nova Scotia, and one in Saskatchewan. The number of firms engaged in this industry under normal conditions is sixteen.

The total output for the year amounted to 172,627 tons, of which quantity approximately 95 per cent, or 164,658 tons, valued at \$1,673,685, was sold. While the quantity sold in 1921 was 45,197 tons less than in the previous year, the value received showed an increase of \$128,961.

Southern Ontario continued to be the chief producer in the salt industry, contributing 98 per cent of the total output.

The Senlac Salt Company operating for five months of the year near Senlac, Saskatchewan, produced slightly less than one thousand dollars worth of common coarse salt. The open pan system of evaporation was used by this company.

The Malagash Mine in Nova Scotia was in operation throughout the entire year, and produced a considerable quantity of common coarse salt. In addition to this, small quantities of table and dairy salt, rock salt and land salt were mined and sold. The last named grade was found to contain potash and was used to some extent as a fertilizer.

Summary statistics relating to the salt industry in Canada are given in the following table:—

TABLE 156

Production of Salt in Canada, 1921

	Quantity Manu- factured	Quantity Sold	Value of Salt Sold (Not including packages)	Stocks on hand at end of year
	Tons	Tons	\$	Tons
Table and dairy.....	40,992	40,961	755,721	31
Common fine.....	41,398	36,074	455,204	6,526
Common coarse.....	33,442	30,905	327,279	3,935
Land salt.....	3,246	3,197	39,071	119
Other grades.....	3,017	2,989	27,713	28
Brine for chemical works.....				
(Salt equivalent sold or used).....	50,532	50,532	68,697	
Total.....	172,627	164,658	1,673,685	10,639

Consumption of Salt in Canada, 1919, 1920 and 1921

TABLE 157

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Table and dairy.....	34,396		42,475		40,961	755,721
Common, fine.....	47,571		39,700		36,074	455,204
Common, coarse.....	64,426		122,628		84,426	423,689
Land salt.....	1,908		5,052		3,197	39,071
Total.....	148,301	1,397,929	209,855	1,544,724	164,658	1,673,685
Value packages.....		573,795		753,763		661,631
Stocks on hand, Dec. 31.....	2,974		5,481		10,639	
<i>Exports.....</i>	617	14,573	303	9,181	348	7,584
<i>Imports—</i>						
Fine, in bulk ¹	51,941	289,109	54,338	356,389	45,677	294,543
In bags, barrels ²	33,173	467,581	33,615	446,671	33,531	455,962
All other ³	62,292	553,439	67,693	631,627	50,515	274,763
Total imports.....	147,406	1,310,129	155,646	1,434,687	129,723	1,025,268
Consumption of salt ⁴	295,090	2,693,485	365,798	2,970,230	294,033	2,691,369

¹Duty 5 cents per 100 pounds; ²Duty 7½ cents per 100 pounds; ³Free—Imported for use of sea or gulf fisheries. ⁴Sum of production and imports, less exports.

SODIUM CARBONATE

The Lillooet Soda Company, Limited, shipped some 197 tons of sodium carbonate crystals during 1921. These shipments were made from a deposit located near Clinton, Lillooet District, British Columbia. The production of soda ash from salt brine is now carried on in Canada on a very large scale.

This material is used in the manufacture of glass, soap and paper, for bleaching and washing linen, cotton, wool, etc.; dyeing and printing fabrics; preventing the formation of boiler scale and also as a reagent in analytical chemistry.

SODIUM SULPHATE

Sodium sulphate is produced in Canada from natural deposits in the province of Saskatchewan. One of these is located near Hardy, Saskatchewan, and is operated by the Sodium Sulphate Company of Saskatchewan, Limited; the other, situated at Maskakee Lake, near Dana, Sask., is worked by the Salts and Chemicals, Limited, of Kitchener, Ontario.

The total quantity of natural sodium sulphate sold during 1921 amounted to 624 tons, comprising 112 tons crude, averaging \$16.29 per ton and 512 tons refined or glauber's salt at \$33.25 a ton. Sales for the same period of 1920 were slightly higher, totalling 811 tons worth \$19,496.

Production and Imports of Sodium Sulphate, 1919, 1920 and 1921

TABLE 158

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Natural Sodium Sulphate—						
Crude.....	15	450	811	19,496	112	1,824
Refined.....					512	17,026
Artificial Sodium Sulphate—						
Sodium sulphate.....	4,153	73,240	5,524	111,983	2,418	54,804
Glauber's salt.....	1,417	45,731	1,781	50,336	1,239	42,719
<i>Imports—</i>						
Soda, sulphate of, crude, known as salt cake.	23,953	343,007	42,974	958,628	27,654	690,311

TALC

The total quantity of talc mined in Canada during 1921 was 10,150 tons, of which 10,134 tons was ground. Sales of crude and ground talc reported for the year totalled 10,134 tons, valued at \$14.27 per ton, as against 19,610 tons, with an average value of \$15.49, in 1920. By grades, the average price obtained per ton was: high, \$22; medium, \$14; and low, \$8, while the crude product sold for \$4 a ton.

The Henderson Mines Limited, and the Asbestos Pulp Company, Limited, (formerly the Anglo-American Talc Corporation) were the only Ontario producers in 1921. The output of the former company was milled in the plant operated by the Messrs. Geo. H. Gillespie and Company, Limited, of Madoc. The British Columbia production was derived from a talc deposit operated by the Eagle Talc and Mining Company in the Victoria Mining Division.

Production in Canada and Exports of Talc, 1919, 1920 and 1921

TABLE 159

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production—</i>						
Crude.....	12,243	49,074	11,820	48,939	.....	.....
Refined.....	6,399	67,221	9,851	117,995	10,134	144,565
Total.....	18,642	116,295	21,671	166,934	10,134	144,565
<i>Exports.....</i>	.....	210,150	.....	263,708	7,115	112,724

STRUCTURAL MATERIALS AND CLAY PRODUCTS

During the year 1921, in common with all other industries, the production of structural materials and clay products in Canada suffered a general decline. To a considerable extent, this loss was due to the high prices of materials and the consequent slowing down of building and construction activities, and to a less extent, to labour difficulties in the building trades.

For the purposes of statistical compilation, structural materials and clay products have been divided into the following classes: cement, clay products, lime, sand and gravel, slate, and stone; clay products was further separated into smaller groups. Compared with 1920, even though the average prices of the different commodities for 1921 did not drop much below those of 1920, there was a considerable falling off not only in the number of active plants but also in the yearly production. The production of the principal commodities in the two years was as follows, those for 1920 being shown in brackets: cement, 5,752,885 barrels (6,651,980 barrels); lime, 6,879,066 bushels (9,427,334 bushels); sand and gravel, 11,574,862 tons (11,530,795 tons) and the value of clay products \$8,857,818, (\$10,664,929); and stone \$6,343,696, (\$7,580,351). While the data refer to Canada as a whole, the conditions in each province showed much the same trend.

In the following table, summary statistics covering production, imports, exports and consumption are presented. Decreases were shown in nearly every item. The apparent increase in the consumption of cement in 1921 was largely due to the decline in exports which during this year were about \$1,500,000 below those for 1920. The table follows:—

Summary Statistics of Structural Materials and Clay Products, 1919, 1920 and 1921

TABLE 160

		Production	Imports	Exports	Con- sumption
		\$	\$	\$	\$
Cement, Portland and puzzolan.....	1919	9,802,433	64,443	465,954	9,400,922
	1920	14,798,070	130,919	2,193,626	12,735,363
	1921	14,195,143	82,615	650,658	13,627,100
Clay and clay products.....	1919	7,906,366	5,269,328	164,254	13,011,440
	1920	10,664,929	9,414,783	358,151	19,721,561
	1921	8,857,818	7,517,222	245,835	16,129,205
Lime.....	1919	2,310,607	53,190	128,810	2,234,987
	1920	3,818,553	48,790	381,899	3,485,444
	1921	2,781,197	19,512	247,112	2,553,597
Sand-lime brick*.....	1919	484,854			484,854
	1920	724,918			724,918
	1921				
Sand and gravel.....	1919	2,680,460	200,428	131,140	2,749,748
	1920	4,291,067	267,950	193,503	4,365,514
	1921	2,537,249	114,575	201,711	2,450,113
Slate.....	1919	10,853	142,977		153,830
	1920	14,200	259,173		273,373
	1921	22,325	267,599		289,924
Stone.....	1919	4,225,937	960,925	54,115	5,132,747
	1920	7,580,351	1,217,216	102,988	8,694,579
	1921	6,343,696	927,694	57,924	7,213,466
Total.....	1919	27,421,510	6,691,291	944,273	33,168,528
	1920	41,892,088	11,338,831	3,230,167	50,000,752
	1921	34,737,428	8,929,217	1,403,240	42,263,405

*Not included under Mineral Production in 1921.

CEMENT

The decline in the production of cement in Canada in 1921 was not as noticeable as in some of the other building materials. The total output of Portland cement from Canadian mills amounted to 6,449,656 barrels and was valued at \$16,016,709. Sales during the year amounted to a total of 5,752,885 barrels having a selling value of \$14,195,143, as compared with 6,651,980 barrels valued at \$14,798,070 in the preceding year. The decline in output was only about 49,000 barrels, but the falling off in sales was in the neighbourhood of 900,000 barrels, the decline in the value of sales amounting to about \$600,000. Stocks on hand at the mills increased from nearly 1,000,000 barrels at the beginning of the year to 1,603,000 barrels at the end of the year.

The principal producing provinces were Ontario and Quebec, the sales of cement from the former province being valued at approximately \$6,424,000, while the value of the cement from mills in Quebec amounted to \$5,410,000. The cement manufactured in the province of Quebec amounted to 2,748,000 barrels, while Ontario produced 2,671,556 barrels.

Exports of cement during the year amounted to 848,208 cwt., equivalent to 242,345 barrels of 350 pounds each, valued at \$650,658.

Imports of cement and manufactures of cement were negligible, the total importations during the year amounting to only \$82,615.

Summary Statistics of Cement in Canada, in 1919, 1920 and 1921

TABLE 161

	1919		1920		1921	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
<i>Plants—</i>						
ACTIVE—No. and capacity.....	10—30,025		13—39,025		14—41,942	
IDLE —No. and capacity.....	11		14		9	
<i>Output—</i>						
Marl.....	110,899		(b) 86,171		(b) 10,676	
Limestone.....	4,512,689		6,412,379		6,438,980	
	4,613,588		6,498,550		6,449,656	
Sold or used.....	4,995,257	9,802,433	6,651,980	14,798,070	5,752,885	14,195,143
Stocks Dec. 31.....	1,089,970		936,173		1,603,215	
<i>Imports—</i>						
Portland.....	14,066	51,314	32,963	112,466	12,057	75,670
Manufactures.....		13,129		18,453		6,945
<i>Exports</i>	(a) 177,506	465,954	(a) 835,667	2,193,626	242,345	650,658
<i>Consumption</i>	4,831,817		5,849,276		5,522,597	

(a) Quantity not recorded but estimated at the rate of 75 cents per cwt. or \$2.62½ per barrel.

(b) Including puzzolan.

CLAY AND CLAY PRODUCTS

The production of clay products covered brick of various kinds, such as common and pressed, ornamental and fancy building bricks, firebrick, silica brick and also sewer pipe, tile and pottery. There was also included clays, such as fireclay and kaolin or china clay.

The total value of clay products sold in 1921 was \$8,857,818, as against \$10,664,929 in 1920 and \$7,906,366 in 1919. The decrease for 1921 amounted to 16.9 per cent in value. In the following table a summary of statistics relating to this industry is shown for a period of three years.

Production, Imports and Exports of Clay and Clay Products, 1919, 1920 and 1921

TABLE 162

		1919		1920		1921	
		Quantity	Value	Quantity	Value	Quantity	Value
			\$		\$		\$
<i>Manufactured—</i>							
Common brick.....	M	302,278		347,016		218,753	3,558,576
Pressed brick.....	M	81,146		102,868		83,165	1,769,840
<i>Stocks Dec. 31—</i>							
Common.....	M	51,110		84,023			
Pressed.....	M	18,458		28,668			
<i>Production (Sales)—</i>							
Common brick.....	M	291,470	3,850,219	303,343	4,835,996	220,438	3,567,503
Pressed brick.....	M	74,424	1,304,162	85,137	2,004,537	80,947	1,738,293
Fire proofing.....	Tons.	41,406	345,382	49,091	591,418		452,296
Hollow building blocks.....	M	1,985	76,673		302,261	3,627	177,273
Kaolin.....	Tons.	759	13,744	683	15,022	124	1,888
Ornamental.....	M	365	10,175	3,515	73,926	1,995	50,576
Terra-cotta lumber.....			40,527		46,743		134,193
Pottery.....			185,474		209,171		231,262
<i>Refractories—</i>							
Fireclay.....	Tons.	4,600	24,163	8,321	44,091	2,931	29,851
Firebrick.....	M	5,610	268,756	7,293	375,230	4,502	242,462
Other products.....	Tons.	2,946	96,435		54,792		91,685
Sewerpipe.....	"	62,821	1,074,146	53,887	1,549,090		1,666,584
Tile, drain.....	M	20,078	616,510	14,527	562,652		473,952
			7,906,366		10,664,929		8,857,818
<i>Imports—</i>							
Bath brick.....			1,135		1,793		1,315
Building brick.....	M	7,394	128,876	2,944	94,314	4,269	126,765
Building blocks.....			102,107		153,250		120,980
<i>Clays—</i>							
China.....	Tons.	8,643	129,652	13,445	234,668	8,130	138,775
Fire.....	"	30,777	185,156	50,611	267,180	31,282	148,059
Pipe.....			922		2,804		866
Other clays.....			46,420		145,988		72,451
Drain tile, unglazed.....			481		5,744		5,815
Drain and sewerpipe.....			66,727		30,111		41,107
Earthen and chinaware.....			2,925,295		5,380,462		5,023,211
Firebrick (a).....			906,481		1,388,390		630,132
Firebrick, n.o.p.....			434,505		579,365		445,053
Magnesite brick.....			120,189		446,445		61,728
Silica brick.....			(b) 157,374		378,759		229,400
Paving brick.....	M	3,552	77,374	2,269	74,515	1,323	41,523
Other clay manufactures.....			144,008		230,995		162,417
			5,426,702		9,414,783		7,249,597
<i>Exports—</i>							
Building brick.....	M	4,770	52,050	8,073	115,627	2,136	29,778
<i>Clay—</i>							
Unmanufactured.....	Cwt.	5,901	3,672	4,738	2,175	2,095	885
Manufactures.....			84,953		196,222		80,009
Earthenware.....			23,579		44,127		135,163
			164,254		358,151		245,835
<i>Consumption.....</i>			13,168,814		19,721,561		15,861,580

(a) Duty free, of a kind not made in Canada. (b) Last 9 months.

Brick, Common and Pressed—Over 50 per cent of the production of the industry under review consisted of common and pressed brick. In 1921 the total value of these two items amounted to \$5,305,796 as compared with a reported production in 1920 of \$6,840,533.

Clay Paving Brick—Paving brick was formerly made in Canada, chiefly at West Toronto, Ont., from shale obtained from the banks of the Humber river, and more recently, during the years 1915 and 1916, there was a small production reported from Clayburn, B.C. There was no production reported for the past four years. The annual production for a number of years varied from 3,000,000 to over 5,000,000 per season.

Drain Tile—The total sales of drain tile in Canada in 1921 were valued at \$473,952. The greater part of this production was from Ontario, the sales in this province being valued at \$397,104.

Kaolin—The shipments of kaolin in 1921 were 124 tons, valued at \$1,888, as compared with 683 tons, valued at \$15,022 in 1920.

The production was obtained from the deposits in the township of Amherst, Ottawa county, Quebec, operated by the Canadian China Clay Company of Toronto. The plant for refining the clay is situated two miles from St. Remi d'Amherst, and seven miles from Huberdeau, the terminus of the Montfort Branch of the Canadian National Railway, forty-six miles northwest of Montreal.

Pottery—Sanitary porcelain was made at St. Johns, Que., and electric porcelain at Hamilton and Peterborough, Ont. The raw materials, including clays, ground quartz and feldspar were all imported.

Stoneware pottery, such as crocks, jars, churns, and jardinieres, was made at Medicine Hat, Alta., from Saskatchewan clay; at Hamilton, Ont., from imported clays; and at St. John, N.B., partly from Nova Scotia clay.

Flower pots were made at a few localities from domestic red burning and tile clays.

Refractories—The total value of the sales of refractories amounted in 1921 to \$816,294. This production included: fireclay or refractory clay sold as such, \$29,851, firebrick valued at \$242,462, fireclay blocks and shapes valued at \$91,685 and fireproofing and hollow porous blocks to the value of \$452,296.

Sewerpipe—The total sales of sewerpipe in 1921 were valued at \$1,666,584. About 56 per cent of the value of the production was credited to Ontario.

Production of Clay Products in Canada, by Provinces, 1921

TABLE 163

Province	Common brick				Pressed brick			
	No. manu- factured	Sold or used			No. manu- factured	Sold or used		
		Number	Value	Per M.		Number	Value	Per M.
			\$	\$			\$	\$
Nova Scotia.....	9,946,700	9,817,200	108,250	11.03				
New Brunswick.....	2,500,000	1,800,000	26,300	14.61				
Quebec.....	61,850,915	70,241,354	1,020,184	14.52	11,571,001	11,931,066	251,137	21.05
Ontario.....	119,275,155	114,582,789	2,025,643	17.68	58,834,179	57,026,965	1,194,580	20.95
Manitoba.....	9,759,000	9,357,552	169,219	18.08	1,361,710	622,900	22,837	36.66
Saskatchewan.....	4,666,500	3,789,175	50,718	13.39	2,455,000	1,900,000	56,628	29.80
Alberta.....	4,553,800	7,180,085	103,265	14.38	7,785,420	8,358,509	164,049	19.62
British Columbia.....	6,201,320	3,670,088	63,924	17.42	1,107,958	1,107,958	49,062	44.28
Total.....	218,753,390	220,438,243	3,567,503	16.18	83,165,268	80,947,398	1,738,293	21.47

Province	Fire clay		Fire brick			Fire clay blocks and shapes	Fire proofing and hollow porous blocks
	Sold or used		No. manu- factured	Sold or used			
	Tons	Value		Number	Value	Sold or used	Sold or used
		\$			\$	\$	\$
Nova Scotia.....	1,183	5,619	829,850	598,000	30,992	156	
New Brunswick.....	60	300					
Quebec.....	40	160	12,000	12,000	370	53,519	46,802
Ontario.....	463	7,756	991,515	1,094,069	62,891	17,782	269,047
Manitoba.....							
Saskatchewan.....	199	1,532	410,000	304,000	12,469		
Alberta.....							136,447
British Columbia.....	986	14,484	2,494,164	2,494,164	135,740	20,228	
Total.....	2,931	29,851	4,737,529	4,502,233	242,462	91,685	452,296

Province	Moulded and ornamental brick		Hollow building brick or blocks			Drain tile	Sewer pipe
	Sold or used		No. manu- factured	Sold or used		Sold or used	Sold or used
	No. manu- factured	Value		Number	Value		
		\$			\$	\$	\$
Nova Scotia.....						3,702	213,042
New Brunswick.....							
Quebec.....	10,890	42,725	1,388	528,000	440,000	36,999	21,362
Ontario.....	2,200,230	1,877,759	46,795	584,645	606,835	31,486	397,104
Manitoba.....				697,000	626,000	16,926	
Saskatchewan.....				406,000	281,000	11,897	33,000
Alberta.....	245,400	74,800	2,393	1,507,219	1,061,192	17,376	3,717
British Columbia.....				794,250	612,750	62,589	15,067
Total.....	2,456,520	1,995,284	50,576	4,517,114	3,627,777	177,273	473,952

Province	Architect- ural terra-cotta and tile other than drain	Pottery	Kaolin		Total	
	Sold or used	Sold or used	Sold or used		Sold or used	Per cent of total value
			Tons	Value		
	\$	\$		\$	\$	
Nova Scotia.....					361,761	4.08
New Brunswick.....		40,000			66,600	.75
Quebec.....	13,260		124	1,888	1,744,760	19.69
Ontario.....	120,594	69,984			5,183,125	58.55
Manitoba.....					208,982	2.35
Saskatchewan.....					166,244	1.87
Alberta.....		121,278			710,477	8.02
British Columbia.....	339				415,869	4.69
Total.....	134,193	231,262	124	1,888	8,857,818	100.00

LIME

The production of quicklime during 1921 amounted to 5,965,381 bushels valued at \$2,345,469. In addition to this, a total of 31,979 tons of hydrated lime valued at \$435,728 was also made during the period. The total value of the lime produced during the year was therefore \$2,781,197 as compared with a valuation of \$3,818,553 for the 1920 production.

The decline in the production of lime was almost directly proportional to the decrease in the construction industries of Canada throughout the year. The average price obtained for quicklime remained in the neighbourhood of 40 cents per bushel, although there was the customary variation in the prices obtained in the several provinces of the Dominion. The average value of hydrated lime was about \$14 a ton.

Ontario's production of lime during 1921 amounted to 3,530,547 bushels, valued at \$1,344,188, comprising 2,763,062 bushels of quicklime, valued at \$962,439, and 767,500 bushels of hydrated lime, worth \$381,749. Quebec was the next largest producer, contributing 2,040,451 bushels evaluated at \$790,503.

Scarcely any lime was imported into Canada during the year; the total value of imports amounted to \$19,512. More lime was exported, the Customs figures showing a total of \$247,112 as the value of exportations of this commodity during the period.

Quantity and Value of Lime Sold or Used in 1921, showing Purpose for which Sold or Used

TABLE 164

Purpose for which sold or used	Sold or Used			
	Quicklime		Hydrated Lime	
	Bushels	Total selling value at kiln	Tons	Total selling value at kiln
Building and whitewashing.....	1,237,158	\$ 480,665	26,069	\$ 380,042
Chemical works.....	971,387	313,721	746	8,448
Smelters.....	313,827	95,196		
Paper mills, sulphite and soda pulp works.....	1,465,886	541,521	1,523	14,422
Sugar factories.....	371,911	119,081		
Tanneries.....	35,845	14,340	1	13
Agricultural uses (fertilizers).....	75,477	11,299	1,814	12,819
Dealers (uses unspecified).....	801,415	503,830	1,526	16,579
Other purposes.....	692,475	265,816	300	3,405
Total sold or used.....	5,965,381	2,345,469	31,979	435,728

Imports and Exports of Lime, 1919, 1920 and 1921

TABLE 165

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
Imports.....	3,977	\$ 53,190	2,739	\$ 48,790	1,211	\$ 19,512
Exports.....	9,654	128,810	23,016	381,899	12,722	247,112

Output and Sales of Lime in Canada, by Provinces, 1919*, 1920* and 1921

TABLE 166

		Quicklime			Hydrated Lime			Total	
		Quantity made		Sold or used	Quantity made		Sold or used	Sold or used	
		Bushels	Bushels		Bushels	Bushels		Bushels	Selling value at kiln
				\$			\$		\$
Nova Scotia.....	1919							366,543	73,309
	1920							201,500	40,300
	1921	25,914	25,914	6,085				25,914	6,085
New Brunswick.....	1919							468,533	223,193
	1920							701,859	365,030
	1921	564,085	562,447	203,084				562,447	203,084
Quebec.....	1919							1,796,822	493,762
	1920							2,108,203	826,044
	1921	1,944,751	1,940,594	754,375	98,514	99,857	36,128	2,040,451	790,503
Ontario.....	1919							3,578,834	1,143,973
	1920							5,109,635	1,962,086
	1921	2,763,062	2,763,062	962,439	770,970	767,485	381,749	3,530,547	1,344,188
Manitoba.....	1919							476,452	147,131
	1920							605,399	210,984
	1921	413,283	413,283	136,375				413,283	136,375
Alberta.....	1919							109,067	41,276
	1920							139,433	72,477
	1921	107,083	107,083	48,332				107,083	48,332
British Columbia.....	1919							351,253	187,963
	1920							561,305	341,632
	1921	175,183	152,998	234,779	52,714	46,343	17,851	199,341	252,630
Total for Canada.....	1919		6,348,933	2,015,443		798,571	295,164	7,147,504	2,310,607
	1920		8,410,334	3,337,267		1,017,000	431,286	9,427,334	3,818,553
	1921	5,993,361	5,965,381	2,345,469	922,200	913,685	435,728	6,879,066	2,781,197

*Separate statistics not available for Quicklime and Hydrated Lime, by Provinces in 1919 and 1920.

SAND AND GRAVEL

Sand and gravel was produced in all provinces of Canada. The different grades, quantities and values of the production during 1919, 1920 and 1921 were as follows:—

Total Production of Sand and Gravel in Canada, 1919, 1920 and 1921

TABLE 167

Kind	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Sand.....	1,100,827	602,138	1,375,812	935,107	1,755,086	596,980
Sand and gravel.....	1,039,104	606,486	2,103,418	1,354,912	2,635,957	802,133
Crushed gravel.....					70,215	63,454
Ballast.....	8,119,387	1,373,704	7,940,700	1,883,833	6,971,874	981,277
Moulding sand.....	55,451	71,249	44,353	59,271	91,680	70,254
All other.....	49,712	26,883	66,512	57,944	(a) 135 (b) 49,915	100 23,051
Total.....	10,364,481	2,680,460	11,530,795	4,201,067	11,574,862	2,537,249
Imports.....	200,830	200,428	219,398	267,950	165,489	114,575
Exports.....	1,074,341	131,140	1,491,786	193,503	1,396,728	201,711

(a) Glass sand. (b) Other sand including blast, core and engine sands.

While sand and gravel for railway ballast amounted to over sixty per cent of the total, the material used in building and construction, and in concrete was important, amounting to about 38 per cent. Although most of the sand and gravel produced by the railways was used in the form of ballast for the roadbeds, there were other grades produced in less important quantities

Railway Production of Sand and Gravel in Canada, 1921

TABLE 168

Kind	Tons	Value
		\$
Moulding sand.....	240	780
Building sand and sand for concrete road-work.....	31,911	6,270
Other sand (including blast, core and engine sands).....	34,829	9,416
Sand and gravel for ballast.....	6,847,223	933,643
Sand and gravel for concrete, road-building, etc.....	782,663	188,816
Total.....	7,696,866	1,143,925

Of the other producers of these commodities there were 218 in Canada as follows: Nova Scotia, 11; New Brunswick, 2; Quebec, 11; Ontario, 171; Manitoba, 8; Saskatchewan, 6; Alberta, 4; British Columbia, 5.

The small amounts used in the Yukon were not important relating only to local construction of foundations, etc. The total production by the above operators is shown below.

Production of Sand and Gravel by Other Operators in Canada, 1921

TABLE 169

Kind	Tons	Value
		\$
Glass sand.....	135	100
Moulding sand.....	91,440	69,474
Building sand and sand for concrete road-work, etc.....	1,723,175	590,710
Other sand (including blast, core and engine sands).....	15,086	13,635
Sand and gravel for railway ballast.....	124,651	42,634
Sand and gravel for concrete, road building, etc.....	1,853,294	613,317
Crushed gravel.....	70,215	63,454
Total.....	3,877,996	1,393,324

SAND-LIME BRICK

A record of the production of sand-lime brick has always been included in the reports of mineral production, but as a detailed record of this industry will appear in the general report on manufactured products, only a few notes are here included. The number of sand-lime bricks produced during 1921 was 43,457,036, having a total value of \$662,744. In 1920 the total number made was 48,926,000, of which 45,459,022, valued at \$724,918, were sold or used. The decline in production was, therefore, in the neighbourhood of 5,000,000 bricks and the falling-off in value of production amounted to about \$60,000.

Four-fifths of the production of sand-lime brick was credited to Ontario, the value of the production in this province amounting to \$534,531. Manitoba ranked second with a production of 6,403,000 bricks, valued at \$116,926. A small production was reported from Alberta, the quantity made being 572,500, the total selling value of which was \$11,287.

The number of plants operated for the production of sand-lime brick in 1921 was ten. Of these plants, seven were located in Ontario, two in Manitoba, and one in Saskatchewan.

SLATE

The entire production of Canadian slate comes from deposits situated along the south shore of the St. Lawrence river in the Province of Quebec. Mining of slate has been carried on in this province since about 1854, the maximum production occurring in the year 1889 and amounting to 695 tons of roofing slate valued at \$119,160. During 1921 the production amounted to 415 squares of roofing slate, valued at \$4,063, and 2,232 tons of crushed slate, valued at \$18,262. The 1921 production of roofing squares as indicated in the table below was a little better than 25 per cent of the figure for 1920. Imports of roofing and other kinds of slate also fell below the figures for the previous year. There were no exports of this commodity.

Production and Imports of Slate, 1919, 1920 and 1921

TABLE 170

	1919		1920		1921	
	Squares	Value	Squares	Value	Squares	Value
		\$		\$		\$
<i>Production</i>	1,632	10,853	(a)	14,200	(b)	22,325
<i>Imports—</i>						
Roofing.....	4,036	27,623	7,114	73,651	5,725	74,385
School-writing.....		46,342		76,594		93,589
Pencils.....		10,059		19,161		9,462
All other.....		58,953		89,767		90,163
		142,977		259,173		267,599

(a) 1,532 squares valued at \$12,362 and 240 tons crushed slate valued at \$1,838.

(b) 415 squares valued at \$4,063 and 2,232 tons crushed slate valued at \$18,262.

STONE

The production of stone for building, monumental and ornamental purposes, for paving, curbstones and flagstones and for the other purposes in which quarry stone is used, amounted in 1921 to a total value of \$6,343,696, as against a value of \$7,580,351 in 1920.

Ontario was the principal producing province, with a production value of \$4,167,582. Quebec came second, with \$1,662,641, while British Columbia, Nova Scotia, New Brunswick, Manitoba and Alberta followed in the order named.

The kinds of stone quarried included granite (trap rock, syenite and other igneous rocks), limestone, sandstone, and marble. In this industry, as in the manufacture of lime, the decline in the construction industries accounted for the decrease in the year's production.

Production of Stone in Canada in 1921, by Kinds, showing Purposes for which used

TABLE 171

	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Building.....	{ Rough 9,869	93,913	26,694	67,076	472	27,363	5,447	28,148
	{ Dressed 4,660	21,926	8,883	229,337	683	140,300	800	4,500
Monumental and	{ Rough 8,672	102,845						
Ornamental	{ Dressed 1,680	148,574	24	1,108				
Flagstone.....	200	4,800	6	103			24	449
Curbstone.....	1,141	4,378	557	4,986				
Paving blocks.....	13,770	214,770	1,280	31,603			295	2,328
Limestone, for flux.....			129,320	233,651				
Limestone for sugar factories, chemical works, etc.....			117,830	135,683				
Rubble and riprap.....	1,512	1,512	48,114	51,055			3,360	5,611
Crushed.....	277,894	345,176	2,989,316	4,400,444	495	5,057	18,500	37,000
Total.....	319,398	937,894	3,322,024	5,155,046	1,650	172,720	28,426	78,036

Production of Stone in Canada in 1921, by Provinces, showing Purposes for which used

TABLE 172

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Total for Canada
Building.....	{ Rough... Tons 2,549		23,098	6,080	2,853	2,962	4,940	42,482
	{ \$ 14,006		108,120	14,672	20,992	13,750	44,960	216,500
	{ Dressed. Tons	800	13,172	1,054				15,026
	{ \$	4,500	379,610	11,953				396,063
Monumental and	{ Rough... Tons 550	3,114	3,057	1,951				8,672
Ornamental.....	{ \$ 12,664	36,918	38,891	14,372				102,845
	{ Dressed. Tons 75	55	1,371	73			130	1,704
	{ \$ 1,893	9,975	119,513	3,801			14,500	149,682
Flagstone.....	Tons	200		30				230
	\$	4,800		552				5,352
Curbstone.....	Tons	141	1,253		304			1,698
	\$	2,128	6,434		802			9,364
Paving blocks.....	Tons	1,351	6,317	7,677				15,345
	\$	15,321	181,698	51,682				248,701
Limestone, for flux.....	Tons 41,974		1,000	55,742			30,604	129,320
	\$ 51,776		700	145,064			36,111	233,651
Limestone for sugar factories chemical works etc.	Tons		50,354	64,264			3,212	117,830
	\$		46,068	83,190			6,425	135,683
Rubble and riprap.....	Tons 2,700		20,964	23,478	4,332		1,512	52,986
	\$ 4,085		21,632	21,089	9,860		1,512	58,178
Crushed.....	Tons 11,075	9,464	598,913	2,555,731	9,379		101,643	3,286,205
	\$ 32,178	23,648	759,975	3,821,207	25,012		125,657	4,787,677
Total.....	Tons 58,923	15,125	719,499	2,716,080	16,868	2,962	142,041	3,671,498
	\$ 116,602	97,290	1,662,641	4,167,582	56,666	13,750	229,165	6,343,696
Per cent of Total..	Quantity 1.60	0.41	19.60	73.98	0.46	0.08	3.87	100.00
	Value 1.84	1.53	26.21	65.70	0.89	0.22	3.61	100.00

Production of Stone in Canada in 1921, by Kinds and by Provinces

TABLE 173

Province	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Nova Scotia.....	11,822	47,101	44,269	55,436			2,832	14,065
New Brunswick.....	14,325	92,790					800	4,500
Quebec.....	19,608	378,021	679,446	1,072,572	1,650	172,720	18,795	39,328
Ontario.....	165,418	233,353	2,547,625	3,927,836			3,037	6,393
Manitoba.....			16,868	56,666				
Alberta.....							2,962	13,750
British Columbia.....	108,225	186,629	33,816	42,536				
Total for Canada....	319,398	937,894	3,322,024	5,155,046	1,650	172,720	28,426	78,036

Production, Imports and Exports of Stone, by Kinds and by Provinces, 1919, 1920 and 1921

TABLE 174

	1919		1920		1921	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
<i>Production, by kinds—</i>						
Granite.....		850,563		1,508,916	319,398	937,894
Limestone.....		3,074,815		5,665,693	3,322,024	5,155,046
Marble.....		213,982		240,593	1,650	172,720
Sandstone.....		86,577		165,149	28,426	78,036
Total.....		4,225,937		7,580,351	3,761,498	6,343,696
<i>Production, by provinces—</i>						
Nova Scotia.....		413,194		420,175	58,923	116,602
New Brunswick.....		125,294		280,167	15,125	97,290
Quebec.....		1,441,919		2,189,325	719,499	1,662,641
Ontario.....		1,936,268		4,035,478	2,716,080	4,167,582
Manitoba.....		89,067		374,286	16,868	56,666
Alberta.....		3,189		4,415	2,962	13,750
British Columbia.....		217,006		276,505	142,041	229,165
Total for Canada..		4,225,937		7,580,351	3,671,498	6,343,696
<i>Imports—</i>						
Building stone.....		212,191		346,082		297,292
Granite.....		110,583		161,024		71,245
Marble.....		438,623		475,030		429,512
Refuse stone.....	416,220	199,528	461,813	235,078	236,024	129,645
Total.....		960,925		1,217,216		927,694
<i>Exports—</i>						
Crushed.....	13,176	12,990	41,972	55,994	2,324	8,648
Ornamental, rough (a).....	846	7,118	1,729	16,941	1,123	13,343
Building, rough (b).....	16,859	23,899	9,612	16,246	3,523	8,996
Dressed.....		10,108		13,807		26,937
Total.....		54,115		102,988		57,924

(a) Granite, marble, etc., unwrought.

(b) Freestone, limestone, etc., unwrought.

PART II

GENERAL STATISTICS

Supplementing the statistics reported in Part One, general reviews have been prepared showing for each principal group in the mineral industry of Canada, statistics of company capitalization, actual capital employed, number of employees, salaries and wages paid, fuel used, power equipment installed, and miscellaneous operating expenses incurred. General tables present the principal statistics of the industry as a whole as well as by groups and by provinces; one section has been devoted principally to mining and milling; another section reviews the metallurgical industry, and there are separate sections each dealing with the general statistics pertaining to a particular industrial group, as the copper-gold-silver industry, nickel-copper industry, asbestos industry, etc.

INDUSTRIAL REVIEW

MINING AND MILLING

In the following survey a series of tables is presented dealing with the output of the mines separately from any closely allied metallurgical operations. Some difficulty has been encountered in drawing the line between metallurgy and mining in those enterprises which carry on both mining and milling. Examples of such cases are the concentrating, amalgamating and cyaniding mills of the gold mining industry, the large reduction works at Cobalt, which are intimately connected with mining, and such metallurgical operations as the amalgamation of placer gold. In these cases it has been found impossible to make any separation, and the survey which follows includes the product from such enterprises, and covers generally the mining and milling industry. In a later section the smelting and refining industry is described and the series of tables of that section cover those industries which smelt ores either by fire or electrical means.

The tables on the mining and milling industry cover distribution of ownership, capital invested, employees, wages and other data. It might be pointed out that for the large companies such as the smelting and refining companies of British Columbia, and the enterprises operating in the nickel-copper industry, which include mines, smelters and refineries, the tables on distribution of ownership, as given in the mining and milling section, refer to the whole industry, and include the smelting and refining. The item "Capital actually invested" is divided as closely as possible into the different sections as reported by the operating companies. The values of the products are the net values, that is, the gross value as determined from the settlement assay, less any transportation and treatment charges. The output or production comprises ores, concentrates and residues or bullion shipped from the mines in 1921.

The following notes describe the more important data:—

Period Covered.—The report refers to the calendar year of 1921; the days in operation or time worked means the total number of individual days all plants were operated.

Distribution of Ownership.—Shows the total par value of the issued securities, such as stocks and bonds, held in various countries. This table is an excellent indication of the proportion of the different industries owned by residents of foreign countries, and, although relating only to incorporated companies, is in nearly all classes descriptive of the ownership of the industry generally.

Capital Employed.—Operators were required to report the capital actually invested in the property under the following heads:

1. Lands, buildings, plant machinery and tools.
2. Cost of all materials on hand, supplies, finished products, ore on dump.
3. Cash, trading and operating accounts, bills receivable.

Owing to the diversity of methods of book-keeping in use by different companies, the returns for capital employed lacked uniformity and can be regarded as showing only general conditions.

Number of Mines and Operators.—General statistics for some metal mines operating but not shipping have been included, but for non-metal mines and the establishments in the structural materials, and clay products group, the statistics given refer only to those properties which made shipments during the year.

Persons engaged in the industry.—The data are divided to show salaried employees and wage-earners. The employees are shown in three classes and are divided into male and female workers. In the case of wage-earners an

attempt has been made to supply information on the actual number of days' work performed by all workers and the wages paid for that time. The work done is given by man-days, i.e., the actual number of individual days' work done and paid for each month. An average daily wage might be calculated from these data for surface, underground workers or mill men in any industry. On the other hand, in tables where the average number of men employed is given, it should be noted that these numbers have been calculated for each property individually and a total made.

Power Employed.—This table represents the number of units installed, and power developed by operating companies only.

Distribution of Ownership of Securities Issued by Mining Companies Incorporated in Canada as at December 15, 1921

TABLE 175

Industry	Par Value of Issued Securities held by Residents of				Total
	Canada	Great Britain	United States	Other Countries	
	\$	\$	\$	\$	\$
Metal Mining—					
Copper-gold-silver mining and milling ¹	9,905,844	3,201,082	38,031,198	44,114	51,182,238
Gold quartz mining and milling ²	114,520,383	3,960,862	51,268,921	213,356	169,963,522
Gold placer and hydraulic mining.....	153,247	11,766,154	17,573,188	28,885	29,521,474
Iron mining and briquetting ³	6,885,270	3,974,733	4,794,447	31,540	15,685,990
Molybdenite mining and milling ⁴	4,086,529	2,700	3,158,305	248,169	7,495,703
Nickel-copper mining and milling ⁵	5,308,766	43,240,495	45,050,454	6,809,757	100,409,472
Silver-cobalt mining and milling ⁶	52,867,834	6,092,631	14,789,731	673,691	74,423,887
Silver-lead-zinc mining and milling ⁷ ...	26,099,377	616,313	10,193,511	2,603,555	39,512,756
Total for Metal Mines and Mills.....	219,827,250	72,854,970	184,859,755	10,653,067	488,195,042
Non-Metal Mines—					
Asbestos mining and milling.....	19,724,969	1,467,300	7,927,280	82,500	29,202,049
Coal mining.....	86,727,930	18,721,941	25,879,964	7,656,638	138,986,473
Gypsum mining and milling.....	1,484,550	400	1,484,500	68,350	3,037,800
Natural gas.....	13,237,270	2,803,999	6,825,823	.....	22,867,092
Petroleum.....	3,388,922	7,050	2,882,689	.....	6,278,661
Salt.....	1,469,080	76,600	305,300	.....	*2,593,980
All other non-metallics.....	5,721,154	171,479	2,250,402	580	8,143,615
Total for Non-Metal Mines.....	131,753,875	23,248,769	47,555,958	7,808,068	*211,109,670
Structural Materials and Clay Products—					
Cement.....	35,116,930	4,297,246	809,100	405,400	40,628,676
Clay products.....	19,505,891	563,688	1,580,780	.....	21,650,359
Lime burning.....	1,924,434	43,600	1,203,450	.....	3,171,484
All other structural materials.....	9,329,940	160,500	503,610	.....	9,994,050
Total Structural Materials and Clay Products.....	65,877,195	5,065,034	4,096,940	405,400	75,444,569
Grand Total.....	417,458,320	101,168,773	236,512,653	18,866,535	774,749,281

¹ This group was composed of 10 producing, 5 operating but not producing, and 49 idle companies. There was also included the value of the stocks, etc., issued by the Granby Consolidated Mining, Smelting and Power Co., because the most important department of that company was copper production. It might be pointed out that the stocks of this company which operated coal and other non-metallic properties have been excluded from other compilations dealing with those groups so that duplication has been avoided.

² Includes 32 producing, 25 operating but not producing and 93 idle incorporated companies.

³ Includes 1 producing, 11 idle companies. Stock of Algoma Steel Company which operates iron properties not included here.

⁴ Includes 10 idle molybdenite and 2 idle tungsten incorporated mining companies.

⁵ Includes all stocks of nickel-copper companies and refers to mining, smelting and refining.

⁶ Includes all silver-cobalt mining, milling and reduction companies situated at Cobalt, Gowganda and South Lorrain, Ontario, 22 producing, 7 operating but not producing and 26 idle incorporated companies. Excludes stock of 3 silver smelters operating in Ontario.

⁷ Comprises 19 producing, 8 operating but not producing and 34 idle incorporated mining companies. Includes stock of the Consolidated Mining and Smelting Co., Trail.

*Includes \$743,000 distribution of which was unknown.

In the following table the principal statistics for the year 1921 are shown under the three main headings, *Metallics*, *Non-Metallics*, and *Structural Materials and Clay Products*. The statistics show capital employed, salaries, wages, and data relating to number of people employed, miscellaneous expenses, cost of fuel used and value of products. All the figures except those under "Capital actually employed" and "Value of products," are complete and final, each industry having been fully covered. In the portion dealing with *metallics*, the net values given to ores shipped by the mines, were in many cases nominal and were made up from book values used by the companies in crediting the mining part of their enterprises. For instance, it was found in the copper-gold-silver section that in some important cases the ores shipped from the mines were valued at much lower figures than the metal contents would indicate. It must also be pointed out that the value of the products shown in the *metallurgical* section is approximate only, since absolute figures for cost of ores, etc., treated, could not be collected.

The value of the *metallic* production as given in this table is approximately one million dollars less than the figure given in the first part of this report as the value of the *metallic* mineral production. The latter is the value calculated from the view point of the world's markets while the data shown in the table below indicates more nearly the actual return to different industries in question.

There is no such difficulty in the value of the production for *non-metallics* and *structural materials and clay products*, and the figures given below agree with those shown in other tables.

Summary of Principal Statistics Relative to Mining, Metallurgy, Structural Materials and Clay Products Industries
Operating Plants, 1921

	Number of active operators	Number of operating plants or mines	Capital actually employed	Number of salaried employees	Salaries paid	Number of wage-earners	Wages paid	Miscellaneous expenses	Fuel cost	Total expenditures	Net value of bullion, ore concentrates or residues shipped from the mines and products made by the smelters
			\$		\$		\$	\$	\$	\$	\$
METALLICS—											
Auriferous quartz mining and milling.....	57	59	48,043,363	238	555,307	3,651	5,517,011	5,474,607	455,015	12,001,940	16,689,784
Silver-cobalt mining and milling.....	33	39	31,198,418	103	257,031	1,121	1,482,675	1,799,458	108,573	3,647,737	6,316,812
Silver-lead-zinc mining and milling.....	61	72	9,888,421 ¹	71	125,146	718	841,025	441,752	78,923	1,486,846	2,177,053
Copper-gold-silver mining and milling.....	14	18	5,256,051 ²	85	197,685	1,137	1,375,536	1,192,018	76,663	2,841,902	2,589,314
Placer mining and milling.....	197	197	10,703,650 ³	.....	.....	428 ³	671,783 ³	.....	.....	671,783	1,576,222 ³
Nickel-copper mining and milling.....	3	8	8,107,245	39	109,385	816	624,851	641,036	52,551	1,427,823	1,575,558
Iron mining and briquetting.....	4	4	4,604,048	.....	.....	44	68,606	86,855	45,376	200,837	230,164
Iron blast furnaces.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,646,790 ⁷
Iron blast furnaces.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15,332,277
Metallurgical works.....	9	14 ⁴	82,206,253	315	737,657	3,367	3,669,300	6,538,522 ⁵	3,097,514	14,042,993 ⁶	.....
Total for Metallics.....	378	411	200,007,449	851	1,982,211	11,282	14,250,787	16,174,248	3,914,615	36,321,861	48,133,974
NON-METALLICS—											
Asbestos.....	15	18	41,357,161	124	258,019	2,570	2,399,406	2,713,440	318,633	5,689,498	4,906,230
Coal mining.....	349	396	176,991,495	1,626	3,717,238	30,223	42,758,471	18,221,563	3,795,151	68,492,423	72,451,656
Feldspar.....	23	23	484,633	12	18,223	131	128,553	55,628	4,237	206,641	230,754
Fluorspar.....	3	3	163,257	4	4,661	77	24,701	15,316	13,145	57,883	136,267
Grindstones.....	3	3	286,993	5	6,540	50	44,645	5,533	6,237	62,955	64,067
Gypsum.....	11	12	3,849,776	36	72,914	766	701,637	565,839	116,554	1,456,944	1,785,538
Magnesite.....	4	4	2,108,227	10	15,006	71	73,650	155,096	22,036	265,788	81,320
Mica.....	20	20	576,237	5	7,738	99	66,684	19,743	4,354	98,529	70,063
Natural gas.....	104	2,022 ⁷	30,368,478	125	177,899	760	705,008	1,405,222	.....	2,288,129	4,594,164
Oxides, iron.....	4	4	207,567	3	5,700	29	36,993	32,065	17,564	92,322	93,610
Petroleum.....	120	2,828 ⁹	3,214,159	19	31,879	171	183,912	136,277	.....	352,068	641,533
Quartz.....	11	11	940,087	8	19,477	86	106,382	135,916	15,975	277,750	312,947
Salt.....	12	13	2,267,708	53	91,829	277	320,503	381,126	527,013	1,319,971	1,673,685
Talc.....	4	4	487,073	5	19,725	54	44,978	65,607	1,565	131,875	1,144,565
All other non-metallics ¹¹	35	38	2,398,742	22	44,444	312	205,972	118,530	38,976	407,922	656,283
Total for Non-Metallics.....	718	5,399	265,701,593	2,057	4,490,792	35,656	47,801,565	24,026,901	4,881,440	81,200,698	87,842,682

STRUCTURAL MATERIALS AND

CLAY PRODUCTS—

216	220	28,515,928	288	582,760	4,118	3,187,493	1,650,449	1,812,232	7,232,934	8,857,818
7	14	49,160,180	343	730,158	2,408	2,713,726	2,602,029	2,788,820	8,834,733	14,195,143
59	66	4,900,969	87	131,152	2,484	2,818,814	4,07,620	698,992	2,056,578	2,781,197
375	375 ¹³	11,138,035	202	334,279	2,668	2,137,903	2,634,533	188,083	5,295,798	8,903,270
Total for Structural Materials and Clay Products...	657	93,805,112	920	1,778,349	10,038	8,857,936	7,294,631	5,489,127	23,420,043	34,737,423
Summary by Classes:										
378	411	200,007,449	851	1,982,211	11,282	14,250,787	16,174,248	3,914,615	36,321,861	48,133,974
718	5,399	265,701,593	2,057	4,490,792	35,656	47,801,565	24,026,901	4,881,440	81,200,698	87,842,682
Structural materials and clay products...	657	93,805,112	920	1,778,349	10,038	8,857,936	7,294,631	5,489,127	23,420,043	34,737,423
Grand Total.....	1,753	559,514,154	3,828	8,251,352	56,976	70,910,283	47,495,780	14,285,182 ¹⁶	140,942,602	170,714,084
Summary by Provinces:										
71	109	82,283,644	625	1,219,264	13,504	15,257,389	8,743,396	2,389,917	27,609,966	.....
Nova Scotia.....	35	2,985,382	66	129,480	914	879,562	347,687	112,609	1,469,338	.....
New Brunswick.....	164	81,494,918	507	978,957	5,805	5,134,716	5,291,586	2,217,303	13,622,562	.....
Quebec.....	741	188,769,764	1,114	2,393,599	13,151	14,318,407	15,233,069	5,105,536	37,050,611	.....
Ontario.....	27	5,343,706	51	98,934	732	665,345	519,249	289,992	1,373,540	.....
Manitoba.....	65	4,761,177	73	141,430	721	585,513	152,204	58,724	937,871	.....
Saskatchewan.....	302	73,603,005	762	1,798,211	10,828	17,402,988	6,639,782	882,415	26,723,396	.....
Alberta.....	177	109,030,712	625	1,468,337	10,840	15,935,477	10,553,669	3,197,606	31,155,089	.....
British Columbia.....	159	11,241,846	5	23,120	461	730,891	15,138	31,080	800,229	.....
Yukon.....	1,741 ¹⁴	6,473 ¹⁴	3,828	8,251,352	56,976	70,910,288	47,495,780	14,285,182	140,942,602	.....
Total for Canada.....										

¹ Excluding capital invested by Consolidated Mining and Smelting Company, Trail; and Kingdon Smelter, Galetta.

² Excluding capital invested by Granby Consolidated Mining and Smelting and Power Company, Anyox.

³ Estimate. Incorporated companies in Yukon Territory paid \$624,783 in wages. Does not include wages paid in British Columbia.

⁴ Includes 3 silver smelters South Ontario; 5 plants nickel-copper smelters and refineries in Ontario and Quebec; 6 plants copper, lead and zinc smelters, Ontario and British Columbia, and refineries in British Columbia and Ontario.

⁵ Includes \$524,627 paid for chemicals.

⁶ Does not include cost of ores concentrates and residues treated.

⁷ Represents value of pig iron made from Canadian ore, deducting the net value of ores treated.

⁸ Includes production of Yukon Territory, 82,394 crude ounces valued at \$16.30 per ounce and production for British Columbia valued at \$233,200.

⁹ Number of wells.

¹⁰ Incorporated companies over Yukon Territory.

¹¹ Includes actinolite, beryllite, chromite, corundum, magnesite, manganese, mineral waters, peat, pyrites, sodium sulphate, and tripolite.

¹² Includes stone quarries and sand and gravel.

¹³ Number of active operators only.

¹⁴ Does not include railway ballast operators.

Power Employed by Operating Companies in the Mining, Metallurgical and Structural Materials and Clay Products Industries in Canada in 1921

TABLE 177

	Boilers		Hydraulic Turbines		Locomotives (b)			Air compressors.
	No. of units	Rated H.P.	No. of units	Rated H.P.	Steam	Electrical	Compressed air	
Metallic mining.....	131	12,486	54	20,538	2	57	2	100
Metallurgical works.....	18	7,875			24	23		18
Coal mining.....	149	81,446	2	12,000	37	36	42	115
Non-metallics other than coal.....	174	16,408	5	655	34	12		63
Structural materials and clay products.....	357	22,778	27	1,559				60
Total.....	829	140,993	88	34,752	97	128	44	356

	Stationary Engines							
	Steam		Steam Turbines		Gas		Oil	
	No. of units	Rated H.P.	No. of units	Rated H.P.	No. of units	Rated H.P.	No. of units	Rated H.P.
Metallic mining.....	60	5,891			4	110	(a) 23	1,178
Metallurgical works.....	3	1,100	8	9,890				
Coal mining.....	670	100,697	18	31,702	31	348	20	1,943
Non-metallics other than coal.....	109	7,394	1	25	198	3,218	16	474
Structural materials and clay products.....	256	17,168	4	560	60	969	-11	310
Total.....	1,098	132,250	31	42,177	293	4,645	70	3,905

	Motors				Generators			
	Alternating current		Direct current		Alternating current		Direct current	
	No. of units	Rated H.P.	No. of units	Rated H.P.	No. of units	Capacity K.W.	No. of units	Capacity K.W.
Metallic mining.....	895	56,945	40	3,433	20	4,906	46	4,429
Metallurgical works.....	200	22,178	189	4,770	4	850	11	2,205
Coal mining.....	600	30,734	153	3,591	73	44,740	61	32,497
Non-metallics other than coal.....	551	30,313	78	4,962	11	582	25	708
Structural materials and clay products.....	1,620	77,332	292	11,560	12	1,675	27	1,484
Total.....	3,866	217,502	752	28,316	120	52,753	170	41,323

(a) Includes 2 air engines of 125 h.p.

(b) Also 3 gasoline locomotives under "Non-metallics other than coal".

Total Fuel Used in the Mineral Industry in Canada in 1921

TABLE 178

Kind	Metal Mines and Smelters		Non-Metal Mines		Structural Materials and Clay Products		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$		\$
Anthracite coal..... Tons	5,374	71,001	24,769	83,579	5,335	37,541	35,478	192,121
Bituminous coal..... "	104,552	1,019,935	1,002,120	4,427,954	533,812	4,675,309	1,640,484	10,123,198
Lignite coal..... "	217	2,648	217,711	117,956	11,086	28,654	229,014	149,258
Coke..... "	143,332	1,965,346	7,629	96,484	714	8,628	151,675	2,070,458
Charcoal..... Cwt.	54,734	13,810					54,734	13,810
Gasoline..... Imp. gal.	390,385	86,469	8,737	4,113	43,945	17,112	443,067	107,694
Fuel oil..... "	2,655,157	354,863	69,387	14,326	55,896	8,103	2,780,440	377,292
Wood..... Cord	21,929	132,802	6,249	27,867	114,868	653,133	143,046	813,802
Artificial and natural gas..... M cu. ft.	862,201	267,741	8,662	3,534	1,095,743	58,362	1,966,600	329,637
Other fuels.....				105,627		2,285		107,912
Total.....		3,914,615		4,881,440		5,489,127		14,285,182

Fuel Used in the Mineral Industry in Canada in 1921, by Provinces

TABLE 179

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia and Yukon	Total for Canada
Anthracite coal.....	Tons	22	2,844	11,535	197		20,787	93	35,478
Value\$		231	27,146	106,829	1,222		53,831	2,862	192,121
Bituminous coal.....	Tons	563,772	10,668	404,145	19,145	2,108	151,166	277,981	1,640,483
Value\$	2,566,398	61,913	1,973,293	3,519,959	197,916	18,779	709,883	1,275,057	10,123,198
Lignite coal.....	Tons			107	1,107	24,104	203,586	110	229,014
Value\$				1,503	6,054	36,293	104,263	1,145	149,258
Coke.....	Tons		7,269	50,046	349			93,887	151,675
Value\$			90,590	744,058	5,705			1,223,595	2,070,458
Charcoal.....	Cwt.			13,546				793	54,734
Value\$				13,546				264	13,810
Gasoline.....	Imp. gal	4,407	4,366	13,449	198,484	187	650	16	221,508
Value\$	1,828	1,869	5,816	39,039	74	341	12	58,715	107,694
Fuel oil.....	Imp. gal	4,084	778	15,234	668,017		7,516		2,084,811
Value\$	1,038	166	3,344	94,490		953			177,301
Wood.....	Cord	4,438	9,778	19,666	71,053	12,854	452	1,516	23,289
Value\$	20,653	46,931	113,544	424,422	79,021	2,358	6,333	120,540	813,802
Artificial and natural gas									
M cu. ft.		3,707	2,500	438,811			659,387	862,201	1,166,606
Value\$		1,499	1,263	51,041			8,093	267,741	329,637
Other fuels.....	Value\$		2,070	105,842					107,912
Total.....	Value\$	2,389,917	112,609	2,217,066	5,100,729	289,992	58,724	3,233,730	14,285,182

Mine Production in Canada, 1920-1921

TABLE 180

	1920			1921		
	Ores or minerals mined	Metals, ores concentrates or minerals shipped	Net value of Shipments	Ores or minerals mined	Metals, ores concentrates or minerals shipped	Net value of shipments
	Tons	Tons	\$	Tons	Tons	\$
Metalliferous ores—						
Iron ores.....	195,870	127,614	509,315	43,208	59,509	230,164
Gold ores—						
Bullion shipped.....		27	12,088,474		31	14,774,037
Concentrates.....	1,300,316	8,456	187,635	1,880,356	16,311	1,915,747
Silver-cobalt ores—						
Mine bullion shipped.....		175½	5,247,809		173½	4,157,983
Ore and concentrates.....	579,261	52,328	4,703,215	398,931	40,611	1,575,558
Nickel-copper ores.....	1,135,792	1,135,792	9,086,336	262,593	262,593	2,589,314
Copper-gold-silver ores.....	1,779,477	987,506	5,522,350	1,197,624	1,042,135	678,337
Silver-lead-zinc ores—						
Lead ore and concentrates.....		69,493	2,985,848		15,352	1,498,716
Zinc ore and concentrates.....	461,925	249,136	1,157,844	390,073	297,406	
Placer mining—						
Yukon.....		3	1,520,392		3	1,300,877
British Columbia.....		½	221,600		½	233,200
Total Metalliferous.....	5,452,641	2,630,531	43,230,818	4,172,785	1,734,125	28,953,933
Total Non-Metalliferous.....			108,027,947			87,842,682
Total Structural Materials.....			41,892,088			34,737,428
Total.....			193,150,853			151,534,043

Contents of Shipments, 1920

TABLE 181

	Gold	Silver	Nickel	Copper	Lead	Zinc
	Oz.	Oz.	Tons	Tons	Tons	Tons
Milling gold ores—						
Bullion.....	581,555	100,550				
Concentrates.....	7,082	169,667				
Silver-cobalt ores—						
Mine bullion shipped.....		5,103,582				
Ore and concentrate.....		5,301,114				
Nickel-copper ores.....			39,156	19,017		
Copper-gold-silver ores.....	95,897	584,974		28,482		
Silver-lead-zinc ores—						
Lead ore and concentrate.....	1,745	2,228,560			18,163	
Zinc ore and concentrate.....	131	653,618				45,517
Placer mining—						
Yukon.....	72,750	16,369				
British Columbia.....	10,719					
Total.....	769,879	14,158,434	39,156	47,499	18,163	45,517

Contents of Shipments, 1921

TABLE 182

	Gold	Silver	Nickel	Copper	Lead	Zinc
	Oz.	Oz.	Tons	Tons	Tons	Tons
Milling gold ores—						
Bullion.....	711,121	120,751				
Concentrates.....	50,841	1,540,561		1.4		
Silver-cobalt ores—						
Mine bullion shipped.....		5,060,454				
Ore and concentrate.....		3,294,581				
Nickel-copper ores.....			6,995.8	4,745.6		
Copper-gold-silver ores.....	88,982	418,390		17,701.9		
Silver-lead-zinc ores—						
Lead ore and concentrate.....	1,468	1,000,587			4,760	147
Zinc ore and concentrate.....	8	856,842			29,248	49,399
Placer mining—						
Yukon.....	65,916	14,831				
British Columbia.....	11,281					
Total.....	929,617	12,307,087	6,995.8	22,448.9	34,008	49,546

METALLIC MINERAL INDUSTRIES

ALLUVIAL GOLD MINING IN CANADA, 1921

Alluvial gold mining in Canada was carried on during 1921 in the Yukon Territory and British Columbia, by 195 firms, comprising 18 joint stock companies, 40 partnerships, and 137 individuals. The 40 partnerships were made up of 92 individuals so the total number active during the period was 18 joint stock companies and 229 others.

The localities where mining operations were carried on and the numbers engaged were as follows:—

TABLE 183

District and Locality	Number of companies	Individual operators or partnerships	Total number of operators
YUKON			
<i>Dawson—</i>			
Bonanza creek.....	*3	13	16
Bonanza creek.....			
Eldorado creek.....			
Miller creek.....			
Hunker creek.....			
Gold Run creek.....			
Klondike creek.....			
Eldorado creek.....	1	5	6
Victoria gulch.....	..	1	1
Hunker creek.....	..	13	13
Klondike river opposite mouth of Hunker creek.....	..	2	2
All Gold creek.....	..	6	6
Last Chance creek.....	2	7	9
Gold Bottom creek.....	..	9	9
Moore's gulch.....	..	1	1
Independence gulch.....	..	1	1
Eighty Pup.....	..	2	2
Rogers gulch.....	..	2	2
Dominion creek.....	2	5	7
Gold Run creek.....	..	1	1
Sulphur creek.....	1	14	15
Quartz creek.....	1	17	18
Little Blanche creek.....	..	1	1
Eureka creek.....	..	5	5
Forty Mile river.....	1	..	1
Sixty Mile and Glacier creeks.....	..	12	12
Clear creek.....	..	3	3
Black Hills creek.....	..	5	5
Thistle creek.....	..	1	1
Henderson creek.....	..	1	1
Russell creek.....	..	1	1
Kirkman creek.....	..	7	7
Scroggie creek.....	..	5	5
Barker creek.....	..	3	3
Nansen creek.....	..	5	5
Higbet creek.....	1	8	8
Haggart creek.....	..	6	6
Dublin gulch.....	..	3	3
Johnson creek.....	..	3	3
<i>Whitehorse—</i>			
Livingstone creek.....	..	6	6
Cottoneva creek.....	..	1	1
Iron creek.....	1	..	1
Bullion creek.....	..	2	2
Fourth of July creek.....	..	1	1
Total.....	3 companies.. } 7 subsidiaries }	178	188
BRITISH COLUMBIA			
<i>Mining Division</i>			
Atlin.....	3	34	37
Cariboo.....	1	14	15
Similkameen.....	1	..	1
Fort Steele.....	2	3	5
Stikene and Laird.....	1	..	1
Total.....	8	51	59

*These three companies were mainly engaged in dredging.

The production from these areas totalled \$1,576,222, of which \$1,343,022 was credited to the Yukon and \$233,200 to British Columbia. The total number of crude ounces recovered was 95,720, of which 82,394 ounces came from the Yukon, leaving 13,326 crude ounces credited to British Columbia.

YUKON OPERATIONS

The principal operators in the Yukon were the Yukon Gold Company Limited, and the New North West Corporation Limited, Burrall and Baird Limited, and the North American Transportation and Trading Company. This latter firm sublet all its mining claims, did no operating and at the time of writing was in process of liquidation. Messrs. Burrell and Baird Limited controlled 7 subsidiary companies which have been reported under one head.

On account of the isolation of the smaller operators and the lack of mail service, much difficulty was met with, in the collection of statistics, and the returns received amounted to only about 70 per cent. However, the statistics for "Distribution of Ownership" may be considered complete while the data on machinery, ditches and other items will closely approximate the actual, since most of the individual operators possessed only small workings.

Par Value of Securities, Issued by Joint Stock Companies in Placer Gold Mining, Yukon Territory, as at December 15, 1921

TABLE 184

	Held by Residents of				Total par value of issued securities
	Canada	Great Britain	United States	Other Countries	
	\$	\$	\$	\$	\$
Stocks.....	18,780	8,030,575	17,446,760	28,885	25,525,000
Bonds.....		1,916,620			1,916,620
Other securities.....		1,818,959			1,818,959
Total for Canada.....	18,780	11,766,154	17,446,760	28,885	29,260,579
Per cent of Total.....		40%	59.6%		

As will be noted in the above table, 40 per cent of these stocks were owned in Great Britain and 59.6 per cent in the United States. Canada held only a negligible quantity.

In Table 185 statistics are given in connection with the working of placer mines. The data given under the three joint stock companies, also cover the subsidiary companies controlled by Burrell and Baird, Ltd., and the New North West Corporation. These companies were responsible for the recovery of over 73 per cent of the total gold won. In the recovery of 69,473 crude ounces some 5,148,750 cubic yards of material was handled. From the value of the gold recovered and the number of cubic yards, the estimated recovery per yard was about 18½ cents. The individual operators in many cases could not closely estimate the yardage of material moved but from figures returned it was calculated that some 850,000 cubic yards were handled in order to recover 21,921 crude ounces. At this rate, the recovery per yard averaged about 40 cents. The worth of this figure is questionable from a statistical point of view, as it cannot be estimated how closely the 850,000 cubic yards approached the true figure. Individual returns showed great variation: recoveries of from a few cents up to five, eight and ten dollars per yard were reported. Six dredges were used and were equipped with from 69 to 82 buckets of 7½ cubic feet capacity. Two of these dredges were designed for reclamation of ground dredged. The power used was in all cases electric. Of the 34 giants in place, only 13 could be used during the season on account of the limited supply of water.

Returns from joint stock companies engaged in placer mining in British Columbia were not so complete as from the Yukon. There were some eight companies operating which compared to those of the Yukon, were small. The issued securities were also insignificant. The value of the British Columbia output was \$233,200 as reported by the British Columbia Mines Department. The bulk of this recovery was made by individual operators of whom there were several carrying on important operations in Atlin and Caribou. Single returns showed a great divergence in recovery, ranging from 5 cents to \$4.10 per cubic yard. Among the many different methods of working reported, drifting and sluicing was extensively used. There were also operated some twenty giants in hydraulic mining, the greatest recovery being made by this method. Drag-line excavators, dump cars and derricks were also in use.

Summary Statistics of Placer Gold Mining in the Yukon Territory in 1921

TABLE 185

Item	Joint Stock Companies (a)	Other Operators (b)	Total
Time in operation..... months	6-8		6-8
Number of wage-earners.....	348	(c) 80	428
Wages paid.....	\$624,783	\$47,000	\$671,783
Crude ounces gold recovered.....	60,473 at \$16.30	21,921 at \$16.30	82,394
Value of gold.....	\$985,710	\$357,312	\$1,343,022
Fineness of gold produced.....	712 to 802-12		
Quicksilver purchased..... lb.	295	(c) 25	320
Quantity of material handled..... cubic yards	5,148,750	Unknown	
Length of ditches..... miles	111	(c) 75	186
Machinery installed—			
Giants.....	(d) 34	not available	
Dredges.....	6		6
Capacity of dredges, cubic yards per 24 hours.....	3,000		3,000
Excavators.....		1	1
Scrapers.....		2	2

(a) Three Joint Stock Companies.

(b) 178 Other Operators.

(c) These items were estimated for the total 178 operators of which about 30 per cent did not return statements.

(d) Only 13 were used, on account of low water.

AURIFEROUS QUARTZ MINING AND MILLING

The recovery of gold from gold quartz ores has been carried on in Canada for many years. Until about the year 1909, when the Porcupine gold field was discovered in Ontario, the bulk of the gold bullion produced directly from quartz veins, came from British Columbia. The quantity of this particular kind of gold was never important until the Ontario fields were developed, and at the present time the Porcupine area and that of Kirkland Lake (discovered about 1911) account for the larger proportion of the Canadian production.

The auriferous quartz mining and milling industry in Canada produced 711,100 fine ounces of gold and 120,746 fine ounces of silver during 1921, the net value of which to the mines was \$14,774,036, not including some \$1,380,000 which was received as premiums on exchange. Of this total, Ontario produced \$14,693,401 or 99 per cent. The production of gold in Canada was higher in 1921 than in any of the previous four years, and while nearly all of the production for the period was credited to Ontario there were important deposits in British Columbia especially, which though then idle would, in more favourable times, increase the production of gold in that province. Most of the gold bullion produced in Canada was recovered by means of the cyanide process, which was practised largely in the Porcupine and Kirkland Lake areas, and in some British Columbia gold mills. In Porcupine, the Hollinger mill operated some 200

stamps followed by cyanidation. The Hollinger and the Dome Mill are the largest mills of their kind in Canada. The McIntyre mine used the cyanide process, while at the Dome mines a combination of the amalgamation and cyanidation processes was employed. In Kirkland Lake all the operating plants were cyanide mills and were owned by the Wright-Hargreaves, the Lake Shore, the Teck Hughes, Kirkland Lake Gold, and Montreal-Ontario Companies. The following table shows the operating mills in Ontario with their daily capacities, also depth of mines.

Ontario Gold Mines in 1921

TABLE 186

Company	Mill	Daily Capacity	Depth of Mining
		Tons	Feet
<i>Porcupine Area—</i>			
Hollinger.....	200 stamps and cyanidation.....	1,000	1,250
McIntyre.....	Cyanide plant.....	550	1,875
Dome Mines.....	60 stamps, amalgamation and cyanidation.	1,100	1,150
North Crown—idle.....	60 stamps, amalgamation and cyanidation.	60	500
<i>Kirkland Lake—</i>			
Wright-Hargreaves.....	Cyanide plant.....	200	700
Teck-Hughes.....	".....	150	760
Kirkland Lake Gold.....	".....	150	1,000
Lake Shore.....	".....	70	600

In Nova Scotia and Manitoba amalgamation in stamp mills with or without plates, was used entirely. In British Columbia the general practice in 1921 was amalgamation of the ores in stamp mills followed by concentration of the tailings which were then shipped to smelters. The largest mines used the cyanide method as did the Premier Gold Mining Company, while the Pioneer Gold Mines, Limited, use a Chilean mill followed by plating and cyaniding. The following is a list of the operating plants:—

British Columbia Gold Mines in 1921

TABLE 187

Company	Mill	Capacity	Depth of mining
		Tons	Feet
Kitselas Mountain Copper Company..	Amalgamation and concentration (idle)..	30	128
Nugget Gold Mines.....	Cyaniding.....	70	
Pioneer Gold Mines.....	Chilian Mill and amalgamation and cyaniding	(20) (40)	300
Premier Gold Mining Co.....	Concentration and cyaniding.....	100	770

In Nova Scotia the milling operations carried on were more or less intermittent or in the form of trial runs. Two incorporated companies and one partnership milled about 100 tons. The operating lessees of which there were five or six, delivered small quantities of ore to local custom gold mills for amalgamation. The ore in Nova Scotia is entirely free milling and the cyanide process is not used.

Nova Scotia Gold Mines in 1921

TABLE 188

Company	Mill	Depth of Mining
		Feet
Inglis and Ramey.....	10 stamp mill (amalgamation).....	90
Montague Gold Fields, Ltd.....	10 stamp mill (amalgamation).....	400
Sherbrooke Mines and Power Co.....	40 stamp mill (amalgamation).....	260

In Manitoba the milling plants are small and are as yet more or less in the experimental stage.

Manitoba Gold Mines in 1921

TABLE 189

Company	Mill	Daily capacity	Depth of mining
		Tons	Feet
Gold Pan Mining Company.....	5 Stamps—amalgamation and concen- tration.....		290
Herb Lake Gold Mines.....	Chilian Mill—amalgamation and con- centration.....	35	270

During the year, gold was produced from auriferous quartz mines in the following provinces in order of importance, Ontario, British Columbia, Nova Scotia and Manitoba. The Ontario areas of production as mentioned above were the Porcupine and Kirkland Lake fields, which are situated about 75 miles north of Cobalt, with a few ounces from the Sturgeon Lake country north of Port Arthur. British Columbia's producers were the Nugget and Pioneer Mines which produced and sold some 3,311 fine ounces. The famous Nickel Plate mine of the Hedley Gold Mining Company did not produce gold bullion during this period. In Manitoba, the Gold Pan Group in Rice Lake district and the Rex and Bingo in The Pas country made shipments totalling one hundred ounces or so, only the Gold Pan and the Rex reporting operations. Nova Scotia was a producer to the extent of some 418 fine ounces, which came from the Sherbrooke Mines and Power Company, Hilehey Mining Company and Montague Gold Fields, Limited. A few small lots were also marketed by lessees and prospectors. During 1921 the gold mining industry benefited considerably by the difference in exchange between United States and Canadian currency. All shipments were marketed at the Royal Mint, Ottawa, for which payment was made in New York funds. The average premium for the year was around eleven per cent.

The producing mines (gold quartz ores and bullion) by provinces were as follows:

Company or Owner	Name of Mine	Location
Ontario—		
The Hollinger Consolidated Gold Mines, Limited.....	Hollinger.....	Tisdale Tp., Temiskaming.
The Dome Mines Company.....	Dome.....	" "
McIntyre-Porcupine Mines, Ltd.....	McIntyre Group.....	" "
North Crown Porcupine Mines, Ltd.....	North Crown Group.....	" "
Lake Shore Gold Mines.....	Lake Shore.....	Teck Tp., "
Wright Hargreaves Mines.....	Wright Hargreaves.....	" "
Teck Hughes Gold Mining Co.....	Teck-Hughes.....	" "
Kirkland Lake Gold Mines.....	Kirkland Lake.....	" "
Ontario Kirkland Gold Mining Co. (no shipments of bullion made).....	Hurd.....	" "
Argonaut Gold Limited.....	Huronias.....	Gauthier Tp., "
St. Anthony Gold Mine.....	St. Anthony.....	Sturgeon Lake, Thunder Bay.
Contact Bay Mines, Ltd.....	Redeemer Contact.....	" "
Pilon & Richards.....	T.B. 1471-2.....	" "
British Columbia—		
Nugget Gold Mines, Ltd.....	Nugget Group.....	Nelson M.D., W. Kootenay.
Horn Silver Mines Partnership.....	Horn Silver.....	Similkameen Yale.
IXL Mining & Milling Co., Spokane leased to Shelledy <i>et al.</i>	IXL.....	Rossland.
Pioneer Gold Mines, Ltd.....	Pioneer.....	Lillooet.
Alex. McDonald.....	Gold Hill.....	Nelson, W. Kootenay.
A. N. Ross.....	Champion Hill.....	" "
Convan Mining Company.....	Marjorie.....	Texada Island, Skeena.
Goldskiesh Mines, Ltd.....	Goldskiesch.....	" "
Premier Gold Mining Co.....	Premier.....	Portland Canal, Skeena.
New Hazelton Gold Cobalt Mines, Ltd.....	Indian Group.....	Omineca, Skeena.
Kitselas Mountain Copper Co.....	Cordillera Group.....	" "
Nova Scotia—		
Sherbrooke Mines Power Co.....	Goldenville.....	Halifax Tp., Halifax Co.
Hilchey Mining Co.....	Hall-Hilchey.....	" "
Montague Gold Fields.....	Skerry.....	" "
W. P. C. Inglis & Co.....	IXL and Toronto.....	Hants Co.
Six individual lessees and prospectors.		
Manitoba—		
Gold Pan Mines, Ltd.....	Gold Pan Group.....	Rice Lake.
Bingo Mines, Ltd. (idle).....	Bingo.....	Herb Lake, Pas District.
Herb Lake Gold Mines, Ltd.....	Rex.....	" "

In addition to the production by the companies listed above there was considerable gold produced from the copper-gold-silver mines and also from placer operations in the Yukon and Northern British Columbia which has not been included in this description.

Table 190 shows the character of ownership, and the distribution of issued stocks, bonds and other securities, with capital invested. The total number of mines in the Dominion which produced gold, or ores in which gold was the chief constituent, was thirty-two, twenty of which were operated by incorporated companies. The individual owners and partnerships, with a few notable exceptions such as the operators of the IXL mine in British Columbia, were of small importance and were included only for the purpose of completing the data for each province. The net value of their products was under \$45,000, out of a total of some 16 million dollars. Gold quartz mining is carried on almost entirely by large corporations capable of investing great amounts of capital.

The total investment in this industry for the whole Dominion was \$37,874,870, of which over 76 per cent, or \$28,752,321, was placed in Ontario. The total net value of the products was \$14,774,036 for gold bullion and \$1,915,747 for ores, concentrates and slags shipped to smelters, making a total of \$16,689,783 net to the mines. This industry is predominately Canadian in ownership, \$41,433,086 out of a total of \$59,444,385 of the stocks and bonds, etc., being held in Canada.

**Capital Invested in the Auriferous Quartz Mining Industry in Canada,
with the Distribution of Ownership of Securities Issued by the
Incorporated Companies, 1921**

TABLE 190

Province	Total capital actually em- ployed*	Total Par Value of Stocks, Bonds and other Securities issued by the Incorporated Companies and held by Residents of the Countries Indicated					
		Security	Canada	Great Britain	United States	Other Coun- tries	Total
	\$		\$	\$	\$	\$	\$
SHIPPING MINES							
Nova Scotia.....		Stocks.....	79,600	139,800	899,932		1,119,332
		Bonds.....			35,900		35,900
Total.....	391,834		79,600	139,800	935,832		1,155,232
Ontario.....		Stocks.....	35,990,757	385,695	11,463,027	67,371	47,906,850
		Bonds.....	101,000	1,000	498,000		600,000
Total.....	28,752,321		36,091,757	386,695	11,961,027	67,371	48,506,850
Manitoba.....			Information	not availa	ble.		
British Columbia.....		Stocks.....	5,211,730	2,905	4,518,559	9	9,732,303
		Bonds.....	49,999				49,999
Total.....	8,612,079		5,261,729	2,005	4,518,559	9	9,782,302
CANADA.....		Stocks.....	41,282,087	527,500	16,881,518	67,380	58,758,485
		Bonds.....	150,999	1,000	533,900		685,899
Total.....	37,874,870		41,433,086	528,500	17,415,418	67,380	59,444,384
OPERATING BUT NOT-SHIPPING							
Ontario.....		Stocks.....	17,691,963	2,972,635	5,271,539	400	25,936,537
		Bonds.....			50,000		50,000
Total.....	9,746,603		17,691,963	2,972,635	5,321,539	400	25,986,537
British Columbia.....		Stocks.....	832,870	400	289,842		1,123,112
Total.....	416,890		832,870	400	289,842		1,123,112
CANADA.....		Stocks.....	18,524,833	2,973,035	5,561,381	400	27,059,649
		Bonds.....			50,000		50,000
Total.....	10,163,493		18,524,833	2,973,035	5,611,381	400	27,019,64
NON-OPERATING MINES							
Nova Scotia.....		Stocks.....			300,000		300,000
Total.....	2,500				300,000		300,000
Ontario.....		Stocks.....	47,160,500	403,293	21,469,668	135,326	69,168,787
		Bonds.....	31,700		11,500		43,200
Total.....	10,761,704		47,192,200	403,293	21,481,168	135,326	69,211,987
Manitoba.....		Stocks.....	5,826,778	36,033	3,309,466	250	9,172,527
Total.....	439,950		5,826,778	36,033	3,309,466	250	9,172,527
British Columbia.....		Stocks.....	1,543,486	20,000	3,151,488	10,000	4,724,974
Total.....	3,674,294		1,543,486	20,000	3,151,488	10,000	4,724,974
CANADA—Total.....	14,878,448		54,562,464	459,326	28,242,122	145,576	83,409,488
TOTAL FOR ALL GOLD MINES IN CANADA							
Shipping mines.....	37,874,870	Stocks, bonds	41,433,086	528,500	17,415,418	67,380	59,444,384
Operating (developing only).....	10,163,493	and other	18,524,833	2,973,035	5,611,381	400	27,109,649
Idle mines.....	14,878,448	securities..	54,562,464	459,326	28,242,122	145,576	83,409,488
Grand Total.....	62,916,811		114,520,383	3,960,861	51,268,921	213,356	169,963,521

NOTE.—In the totals for non-operating gold mines, the figures given cover the more important incorporated companies excluding those companies which at the end of 1921 had not issued any important number of shares. On account of numbers of properties being idle, and also as many apparently had no permanent offices, some difficulty was encountered in securing complete returns. The figures given in this table are relative only, and show approximately the proportion of stock held by residents of the various countries and cover between 85 and 90 per cent of all gold mines in Canada.

Table 191 of this section and the similar table in the copper-gold-silver section show that, while the underground development in the auriferous quartz mines was much less than in the copper-gold-silver, the tonnage of ore produced in the former exceeded the quantity in the latter. The figures were: auriferous quartz, total length underground workings 245,743 feet; copper-gold-silver, 667,279 feet. Ore mined in auriferous quartz totalled 1,908,286 tons and in copper-gold-silver 1,197,624 tons. In comparison with the last mentioned industry and with all other metal mining industries, gold mining is seen to be the most extensive as regards people employed, wages paid and equipment installed.

Ore Mined and Underground Development in the Producing Auriferous Quartz Mines in Canada in 1921

TABLE 191

Province	Number of Mines	Shafts in Operation	Length of Adits or Tunnels	Total Length of Underground Workings	Ore mined
			Feet	Feet	Tons
Nova Scotia.....	8	8	.....	3,980	726
Ontario.....	11	17	.....	226,627	1,867,848
Manitoba.....	2	2	.....	1,085	683
British Columbia.....	11	2	6,036	14,051	39,029
Total for Canada.....	32	29	6,036	245,743	1,908,286

Ores Mined and Milled, Crude Bullion Produced and Shipped from the Gold Mines in Canada in 1921

TABLE 192

	Nova Scotia	Ontario	Manitoba	British Columbia	Total for Canada
Number of mines.....	8	11	2	11	32
Ore mined..... tons	726	1,867,848	683	39,029	1,908,286
Ore milled for amalgamation..... "	696	372,083	484	200	373,463
Tailings retreated..... "	.....	.....	.....	1,401	1,401
Bullion recovered by amalgamation.... crude oz.	465	76,063	265	117	76,910
Ores cyanided..... tons	.....	(a)1,716,946	.....	(b)12,480	1,729,426
Bullion recovered by cyanidation..... crude oz.	.....	836,745	.....	5,117	841,862
Bullion shipped..... "	(c)451	907,572	305	5,234	913,869
Contents of bullion shipped Gold..... fine oz.	418	707,164	207	3,311	711,100
Silver..... "	21	120,335	33	356	120,746
Net value..... \$	8,470	14,693,402	4,206	67,959	14,774,037

(a) This 1,716,946 tons cyanided includes the tailings from the 372,083 tons amalgamated.

(b) This 12,480 tons cyanided does not include the tailings from the 200 tons amalgamated.

(c) 439 fine oz. reported as received at the Royal Mint, 21 fine oz. hand picked from old dumps.

Ores, Concentrates and Slags Shipped from the Gold Mines in Canada in 1921

TABLE 193

	Ontario Mines Shipping		British Columbia Mines Shipping		Total for Canada
	To Canadian Smelters	To American Smelters	To Canadian Smelters	To American Smelters	
Number of mines.....	1	9	4	11	11
Tons of ore, etc. shipped.....	43	9,787	6,481	16,311	16,311
Metal Contents—					
Gold..... ozs.	870	1,830	49,971	52,671	52,671
Silver..... "	3,730	54,341	1,536,921	1,594,992	1,594,992
Copper..... lb.	.....	2,192	2,808	5,000	5,000
Net Value..... \$	19,640	72,087	1,824,020	1,915,747	1,915,747

Salaried Employees and Salaries Paid in Auriferous Quartz Mines and Mills in Canada in 1921

TABLE 194

	On Mine Pay-Roll			On Mill Pay-Roll			Total for Mine and Mill		
	Number of Employees		Salaries	Number of Employees		Salaries	Number of Employees		Salaries
	Male	Female		Male	Female		Male	Female	
NOVA SCOTIA—									
(a) 8 Producing Mines—									
Supts., managers, etc.....	4		7,476				4		7,476
Technical employees, etc.....	1		1,300				1		1,300
Clerks, stenographers.....	1		1,375				1		1,375
Total.....	6		10,151				6		10,151
ONTARIO—									
(a) 11 Producing Mines—									
Supts., managers, etc.....	18		114,940	9		45,214	27		160,154
Technical employees, etc.....	58		122,812	17		36,625	75		159,437
Clerks, stenographers, etc.....	42	4	79,882	9	1	17,479	51	5	97,361
Total.....	118	4	317,634	35	1	99,318	153	5	416,952
(b) 22 Non-Producing Mines—									
Supts., managers, etc.....	22	1	47,740				22	1	47,740
Technical employees, etc.....	11		11,645				11		11,645
Clerks, stenographers, etc.....	12		16,362				12		16,362
Total.....	45	1	75,747				45	1	75,747
(c) Total, all operating mines.....	163	5	393,381	35	1	99,318	198	6	492,699
MANITOBA—									
(a) 2 Producing Mines—									
Supts., managers, etc.....	2		2,250	1		800	3		3,050
Technical employees, etc.....									
Clerks, stenographers, etc.....	1		450				1		450
Total.....	3		2,700	1		800	4		3,500
BRITISH COLUMBIA—									
(a) 11 Producing Mines—									
Supts., managers, etc.....	7		17,712	2		5,688	9		21,400
Technical employees, etc.....	4		7,568				4		7,568
Clerks, stenographers, etc.....	8		12,689				8		12,689
Total.....	19		37,969	2		5,688	21		41,657
(b) 5 Non-Producing Mines—									
Supts., managers, etc.....	2		5,100				2		5,100
Technical employees, etc.....									
Clerks, stenographers, etc.....	1		200				1		200
Total.....	3		5,300				3		5,300
(c) Total, all operating mines.....	22		43,269	2		5,688	24		46,957
CANADA—									
59 Mines—									
Supts., managers, etc.....	55	1	195,218	12		51,702	67	1	244,920
Technical employees.....	74		143,325	17		36,625	91		179,950
Clerks, stenographers, etc.....	65	4	110,958	19	1	17,479	74	5	128,437
Grand Total.....	194	5	449,501	38	1	105,806	232	6	553,307

In Table 195 the data showing the wages paid and the man-days' work performed are given both for mines and mills. By dividing the total for wages paid by the total number of man-days' work performed by the surface and underground workers, a close approximation may be reached of the average wages paid in this industry. For Ontario, the average wage was found to be \$4.57 per day and for British Columbia \$4.45. In Nova Scotia, \$37,914 was paid as wages, but in a few cases, where leasing was done, the statistics were incomplete as to wages, and considerable variation was found between payments to mine and mill workers. The same applied to Manitoba where the

work done was, in some cases, experimental in character and wages paid out were for construction work rather than milling. The average wage for miners in gold mining for Canada was \$4.53.

Average Number of Wage-earners, Work Done and Wages Paid in the Auriferous Quartz Industry in Canada in 1921

TABLE 195

Province	Group	Number	Average number of wage-earners		Man-days' work done		Wages paid
			Surface	Under-ground	Surface	Under-ground	
							\$
Nova Scotia.....	Producing mines	8	21	19	4,580	6,581	32,440
	Mills.....	3	13	.....	1,882	.....	5,474
	Total.....	11	34	19	6,462	6,581	37,914
Ontario.....	Producing mines	11	351	1,801	119,955	629,015	3,391,896
	Non-producing mines.	22	154	130	33,019	32,010	327,313
	Mills.....	7	609	.....	221,063	.....	976,174
	Total.....	40	1,114	1,931	374,037	661,025	4,695,383
Manitoba.....	Producing mines	2	19	19	972	1,252	9,133
	Mills.....	2	7	.....	1,060	.....	5,330
	Total.....	4	26	19	2,032	1,252	14,463
British Columbia.....	Producing mines	11	313	105	113,571	36,310	679,979
	Non-producing mines.	5	18	30	5,441	4,519	31,962
	Mills.....	2	42	.....	9,013	.....	57,310
	Total.....	18	373	135	128,025	40,829	769,251
CANADA.....	Producing mines	32	704	1,944	239,078	673,158	4,113,448
	Non-producing mines.	27	172	160	38,460	36,529	359,275
	Mills.....	14	671	.....	233,018	.....	1,044,288
	Grand Total.	73	1,547	2,104	510,556	709,687	5,517,011

Fuel Used in all Operating Auriferous Quartz Mines and Mills in Canada, 1921

TABLE 196

Kind	Unit of Measure	Ontario		British Columbia		*Total for Canada	
		Quantity	Value	Quantity	Value	Quantity	Value
			\$		\$		\$
Anthracite coal.....	Short tons	1,788	23,919	50	2,421	1,838	26,340
Bituminous coal.....	"	22,893	284,043	.....	.....	23,746	294,707
Lignite coal.....	"	107	1,503	.....	.....	107	1,503
Coke.....	"	334	5,902	.....	.....	334	5,902
Gasoline.....	Imp. gal.	5,098	5,191	23,485	10,904	29,993	16,646
Fuel oil.....	"	22,165	32,443	110,616	22,379	134,365	55,220
Wood.....	Cords	7,488	28,052	2,170	12,970	12,119	54,697
Total for Canada.....			381,053	.....	48,674	.....	455,015

*Includes small quantities used by gold mines in Nova Scotia and Manitoba.

Power and Machinery Employed in all Operating Gold Mines and Mills in Canada, 1921

TABLE 197

Kind	Nova Scotia		Ontario		Manitoba		British Columbia		Total for Canada	
	No. of units	Total H.P. according to manufacturer's rating	No. of units	Total H.P. according to manufacturer's rating	No. of units	Total H.P. according to manufacturer's rating	No. of units	Total H.P. according to manufacturer's rating	No. of units	Total H.P. according to manufacturer's rating
Boilers—Fired by hand.....	2	205	63	6,153	3	200	1	10	69	6,568
Stationary Engines—										
Steam.....	4	185	21	1,593	4	86	2	40	31	1,904
Gas.....			1	7					1	7
Oil.....	1	35	1	25			5	650	7	710
Air.....			2	12					2	125
Hydraulic Turbines or Water Wheels.....	2	500	1	325			4	650	7	1,475
Locomotives—										
Electric.....			20	438					20	438
Gasoline.....			1	10					1	10
Electric Motors—										
Alternating current.....	9	225	409	26,206			8	650	426	27,081
Direct current.....			1	275					1	275
Generators or Dynamos—										
Alternating current.....	2	K.W. 500	6	K.W. 2,100			1	K.W. 450	9	K.W. 2,250
Direct current.....			18	497	1	5			19	502
Air Compressors.....	3	Capacity cu. ft. per min. free air 660	33	Capacity cu. ft. per min. free air 2,637	2	Capacity cu. ft. per min. free air 390	8	Capacity cu. ft. per min. free air 587	46	Capacity cu. ft. per min. free air 1,050

Miscellaneous Expenses Disbursed by all Operating Gold Mines and Mills in Canada, 1921

TABLE 198

	Nova Scotia	Ontario	Manitoba	British Columbia	Canada
	\$	\$	\$	\$	\$
Cost of purchased power for mine or mill use.....		642,072		57,519	699,591
Cost of all materials and supplies used in the mine or mill.....	5,691	3,039,167	3,442	437,284	3,485,584
Royalties paid.....	52		330	38,618	39,000
Taxes { Municipal.....	239	85,509			85,748
Provincial.....	200	109,966		45	110,211
Federal.....		419,205			419,205
All other sundry expenses.....	12,433	535,420	1,100	86,315	635,268
Total miscellaneous expenses.....	18,615	4,831,339	4,872	619,781	5,474,607

COPPER-GOLD-SILVER MINING

The mines of the copper-gold-silver industry produce ores that are as a rule predominately copper-bearing, although in many cases the copper pyrite contains important quantities of gold and silver as by-products. The provinces producing this ore are, in order of importance, British Columbia, Manitoba, Quebec, Ontario and the Yukon Territory. During the year 1921, only British Columbia, Quebec and Ontario were represented by producing mines and the following tables are made up from data referring to the two former provinces only; the Ontario deposit, the Bruce Mine, which was worked in conjunction with the copper-nickel industry, has been included under that section. Eleven copper-gold-silver mines shipped ore in 1921; ten of these were located in British Columbia and one in Quebec.

The following is a list of the shipping mines of Canada during that year.

List of Shipping Mines in the Copper-Gold-Silver Mining Industry in 1921

Name of Company	Name of Mine	Location
<i>Quebec</i>		
Weedon Mining Company.....	McDonald.....	Weedon Tp., Wolfe Co.
<i>Ontario</i>		
*Mond Nickel Company.....	*Bruce.....	Bruce Mines, Algoma
<i>†British Columbia</i>		
Osborne and Howard.....	Spokane.....	Tulameen
Granby Consolidated Mining, Smelting and Power Company, Ltd.....	Hidden Creek Group.....	Atlin
Consolidated Mining and Smelting Company of Canada, Ltd.....	Rossland Group.....	West Kootenay, Nelson Division
Consolidated Mining and Smelting Company of Canada, Ltd.....	Emma.....	Yale
Le Roi No. 2, Limited.....	Le Roi II Group.....	West Kootenay, Nelson Division
Rossland Velvet Mines Ltd.....	Velvet Group.....	West Kootenay, Trail Creek
Britannia Mining and Smelting Co., Ltd....	Britannia.....	Coast Vancouver Division
Lasqueti Mining Co., Ltd.....	Venus.....	Coast Vancouver Division
Maid of Erin Silver Mining Co., Ltd.....	Maid of Erin.....	Cassiar, Atlin
Belmont Surf Inlet.....	Surf Inlet.....	Skeena, Q. Charlotte

* Included with Nickel-Copper Industry.

† Drum Lummon mine also made a small shipment, statistics not available.

During 1921, the copper mining industry like the nickel-copper suffered a severe decline. This was due to the rapid drop in prices which occurred in the last quarter of 1920 and also to the overstocked condition of the world's markets. The precious metal contents of some copper ores enabled a few copper properties to continue in operation. The copper produced in Canada was recovered principally by the large smelters situated at Trail and Anyox, B.C., although important amounts were also derived from the smelting of nickel-copper ores. The principal copper producing mines in British Columbia were the Hidden Creek group of the Granby Consolidated Mining, Smelting & Power Company, Ltd., which mined some 900,000 tons of ore during the year. The Belmont Surf Inlet mined about 130,000 tons. The mines of the Consolidated Mining & Smelting Company of Canada, Ltd., (The Rossland Group and the Emma) produced over 100,000 tons. The other shippers produced small quantities of about one hundred tons. During the period, the Emma mine formerly operated by the Consolidated Mining & Smelting Company of Canada, Ltd., was dismantled.

The ore from the Quebec mines was largely used in the manufacture of sulphuric acid and was also shipped to United States copper smelters. The small quantities of gold and silver contained were not paid for by the smelters.

The copper mines in the Province of Manitoba which, at the present time, are dependent on the British Columbia smelters for the treatment of their ore, were able to ship only during the war when the price of copper had reached its highest level. With the poor transportation facilities obtaining and high freight rates, no shipments of copper ore from Manitoba may be expected. The immense deposits of copper sulphide ore of the Flin Flon mine in the Pas district can only be developed by the erection of a smelter near the orebody and the construction of adequate railway facilities.

For the same reason, the copper properties of the White Horse and Conrad districts of the Yukon Territory were idle throughout the period.

As shown in Table 199, the copper industry in Canada was largely owned by foreign interests. At the end of 1921, about 76 per cent of the issued stocks, bonds and other securities were held by residents of the United States. The total par value of the securities issued by the operating copper-gold-silver mines in British Columbia was \$27,899,392 for nine properties.

The total par value of the securities issued by all the incorporated companies controlling copper-gold-silver mines, including producing, developing and idle properties, was \$51,182,238.

Capital Employed and Distribution of Ownership of the Copper-Gold-Silver Mines in Canada, 1921

TABLE 199

Kind of Mines	Number of Companies	Actual Capital Employed	Distribution of Ownership					Total
			Par Value of Stocks and Bonds Issued by Incorporated Companies and held by Residents of Countries Indicated					
			Security	Canada	Great Britain	United States	Other Countries	
		\$		\$	\$	\$	\$	\$
Producing.....	9	*28,735,938	Stocks.....	3,686,477	2,920,000	17,351,515	.....	23,957,992
			Bonds.....	.....	.....	3,991,400	.....	3,991,400
Total.....	9	28,735,938	.....	3,686,477	2,920,000	21,342,915	.....	27,949,392
Developing.....	5	447,411	Stocks.....	435,148	62,688	194,985	.....	692,821
Total.....	5	447,411	.....	435,148	62,688	194,985	.....	692,821
Idle.....	49	8,288,353	Stocks.....	5,591,115	218,394	13,151,698	9,814	18,971,025
			Bonds.....	73,100	.....	2,746,600	34,300	2,854,000
			Other securities.	120,000	.....	595,000	.....	715,000
Total.....	49	8,288,353	.....	5,784,219	218,394	16,493,298	44,114	22,540,025
Canada.....	63	37,471,702	Stocks.....	9,712,744	3,201,082	30,698,198	9,814	43,621,838
			Bonds.....	73,100	.....	6,738,000	34,300	6,845,400
			Other securities.	120,000	.....	595,000	.....	715,000
Total.....	63	37,471,702	.....	9,905,844	3,201,082	38,031,198	44,114	51,182,238

*Includes capital employed by the Granby M.S. & P. Co. Ltd., which in addition to large copper-gold properties operated coal mines, quartz and limestone quarries.

In the following tables, general data of interest regarding the properties and development of the copper-gold-silver industries are given; the tonnage mined, net value of ore shipped, and wages paid are also shown. Few copper-gold-silver mines reported any development work during the period. In British Columbia these operations were as follows: the Coast Copper Company Limited, diamond drilling on the Merry Widow and Old Sports Group; Basil Cartiano, repairs and underground development on the Rompalo and Silver Lump claims; Kleanza Company Limited, surface work and driving tunnels on its Kleanza property. Other work was carried on by the Peerless Mining Partnership, while the usual assessment work was completed by numerous companies, partnerships and individuals. In Ontario and Alberta, a little development was done by the Algomont Mines Limited and Eldon Mines Limited respectively.

Ore Mined and Underground Development in the Copper-Gold-Silver Mines of Canada, 1921

TABLE 200

Province and Kind of Ownership	Number of Mines	Shafts in Operation	Length of Adits and Tunnels	Total Length of Under-ground Workings	Ore Mined
				feet	tons
QUEBEC— Incorporated Company.....	1	1		*	1,986
BRITISH COLUMBIA— Partnership.....	1				100
Incorporated Companies.....	9	8	5,075	667,279	1,195,538
TOTAL FOR CANADA.....	11	9	5,075	667,279	1,197,624

*Not given.

Only two ore-treating mills reported any operations. These were the mills of the Le Roi No. 2 Limited and the Belmont Surf Inlet. The mills of the Granby Consolidated Mining, Smelting and Power Co. Ltd. at Anyox and the Rossland Velvet were idle throughout the period, and the entire plant of the Britannia Mining and Smelting Company at Britannia Beach was destroyed by fire early in the year. In British Columbia 141,480 tons of ore was concentrated from which 11,884 tons was recovered as concentrates by a combination process of concentration and oil flotation. A large proportion of the British Columbia ores are smelted without preliminary treatment.

In the following table the destination of ores and concentrates shipped from the mines is tabulated. Of the 11 shipping mines only one, the Weedon in Quebec, was located outside of British Columbia, and the statistics are therefore shown together. Of the 1,042,135 tons of ore and concentrates shipped only 38,485 tons went to United States smelters but this quantity included practically all the concentrates produced in Canada.

Shipments from Copper-Gold-Silver Mines of Canada, 1921

TABLE 201

Destination	Quantity	Net Value	Total Net Contents as Determined by Settlement Assay			
			Gold	Silver	Copper	Sulphur
	tons	\$	fine ozs.	fine ozs.	pounds	pounds
10 Mines shipped to Canadian smelters—						
Ores.....	*1,002,935	1,755,559	50,852	377,849	32,408,805	1,166,734
Concentrates.....	715	12,830	738	931	29,021	
6 Mines shipped to foreign smelters—						
Ores.....	† 14,463	36,828	296	9,259	700,005	416,189
Concentrates.....	24,022	784,097	37,097	30,351	2,240,766	
Total for Canada†.....	1,042,135	2,589,314	88,982	418,390	35,403,945	1,582,923

*Includes 3,597 tons pyrites used for manufacture of sulphuric acid.

†Includes 6,608 tons flue dust.

‡Of the 11 shipping mines, 10 were in British Columbia and 1 in Quebec—some of them shipping to both domestic and foreign smelters.

Salaried Employees and Salaries Paid in Copper-Gold-Silver Mines and Mills in Canada, 1921

TABLE 202

	On Mine Pay Roll			On Mill Pay Roll			Total for Mine and Mill		
	Number of Employees		Salaries	Number of Employees		Salaries	Number of Employees		Salaries
	Male	Female	\$	Male	Female	\$	Male	Female	\$
In 11 Producing Mines—									
Superintendents and managers.....	18	..	82,951	1	..	2,341	19	..	85,292
Technical employees.....	18	..	41,795	2	..	1,339	20	..	43,134
Clerks, stenographers.....	35	3	60,720	1	1	839	36	4	61,559
Total.....	71	3	185,466	4	1	4,519	75	4	189,985
In 5 Non-Producing Mines—									
Superintendents and managers.....	4	..	5,300	..	..	..	4	..	5,300
Technical employees.....	1	..	625	..	..	..	1	..	625
Clerks, stenographers.....	1	..	1,775	..	..	..	1	..	1,775
Total.....	6	..	7,700	..	..	..	6	..	7,700
In All Operating Mines—									
Superintendents and managers.....	22	..	88,251	1	..	2,341	23	..	90,592
Technical employees.....	19	..	42,420	2	..	1,339	21	..	43,759
Clerks, stenographers.....	36	3	62,495	1	1	839	37	4	63,334
Total.....	77	3	193,166	4	1	4,519	81	4	197,685

Average Number of Wage-earners, Work Done and Total Wages Paid in Copper-Gold-Silver Mines in Canada, 1921

TABLE 203

	Average number of wage-earners		Man-days work done		Wages paid
	Surface	Under-ground	Surface	Under-ground	
In 11 producing mines.....	311	763	81,163	205,356	\$ 1,304,724
In 5 non-producing mines.....	16	9	7,712	2,101	22,666
In 2 mills.....	42	..	9,437	..	51,386
Total for Canada—					
In 16 mines and 2 mills.....	369	772	98,312	205,457	1,378,776

Fuel Used in Copper-Gold-Silver Mines and Mills in Canada, 1921

TABLE 204

		Fuel used by producing mines	Fuel used by non-producing mines	Total fuel used
Bituminous coal.....	Tons	5,445	1	5,446
	\$	59,559	7	59,566
Coke.....	Tons	124	..	124
	\$	1,466	..	1,466
Gasoline.....	Imp. gals	246	16	262
	\$	85	12	97
Fuel oil.....	Imp. gals	82,157	..	82,157
	\$	12,822	..	12,822
Wood.....	Cords	50	628	678
	\$	200	2,512	2,712
Total value.....		74,132	2,531	76,663

Power Equipment in Operating Copper-Gold-Silver Mines in Canada, 1921

TABLE 205

Kind	Number of units	Rated horsepower according to manufacturer's rating
Boilers—		
Fired by hand.....	11	955
Stationary engines—		
Steam.....	5	625
Gas.....	2	43
Oil.....	1	25
Hydraulic turbines or water wheels.....	11	14,875
Electric motors—		
A.C.....	65	4,445
D.C.....	16	275
Locomotives—		
Steam.....	1	
Electric.....	8	
Generators—		
A.C.....	2	870 K.W.
D.C.....	1	225 K.W.
Total rated horsepower of prime movers, exclusive of boilers and generators.....		20,288
Air compressors operated.....	8	
Power shovels operated.....	2 by compressed air	
Power drills operated.....	134 "	

Miscellaneous Expenses Incurred by Copper-Gold-Silver Mines and Mills in Canada, 1921

TABLE 206

	Producing mines	Non-producing mines	Total
	\$	\$	\$
Cost of purchased power.....	109,389		109,389
Cost of all materials and supplies used.....	934,434	1,130	935,564
Royalties.....	24,656		24,656
Taxes—			
Municipal.....	4,976	24	5,000
Provincial.....	1,779	10	1,789
Federal.....	36,461		36,461
All other sundry expenses.....	48,148	31,011	79,159
Total.....	1,159,843	32,175	1,192,018

THE NICKEL-COPPER INDUSTRY

The nickel-copper mining and smelting industry which is carried on mainly in the Sudbury District in Ontario was represented during 1921 by three operating companies: The Mond Nickel Company, Limited, which in addition to its mine and smelter at Coniston, near Sudbury operated a copper pyrite property at Bruce Mines, Ontario; the International Nickel Company operating mines and smelters at Copper Cliff in the same area, refineries at Port Colborne, Ontario, and in New Jersey, U.S.A.; and the British American Nickel Corporation with mines and smelters at Murray near Sudbury and a refinery at Deschenes, Quebec. In addition to these companies, the Alexo Nickel Mine, in the Porcupine area, although quiescent during 1921, has in the past shipped considerable quantities of ore to Sudbury for smelting. During the period of reconstruction after the war, the nickel-copper industry was forced greatly

to curtail its operations. The large stocks of copper and nickel held in reserve by the warring countries could not be readily absorbed, and as a consequence these war metals moved more slowly towards normal than most others. The state of the world's nickel markets, in 1921 was indicated by a general closing down on the properties controlled by two of the most important companies. The Mond Company operated throughout the year but at a greatly reduced rate. No mining was carried on at Bruce Mines although some shipments were made during the first two months from ore on hand. The International Nickel Company operated for eight months and the British America for two. The refineries continued to operate until nearly the end of the period when these also were closed down.

The data given in the following tables are descriptive of the whole nickel-copper industry including mining, smelting and refining.

Capital Employed—The capital actually invested in properties has been shown in Table 207, division being made to show separately the cost of plant at the mines, smelters and refineries. The Items "Cost of all materials, etc.," and "Cash, trading and operating accounts," refer to the whole industry.

Capital Employed in the Nickel-Copper Industry in 1921

TABLE 207

Buildings, plant machinery and tools:	
Mines.....	\$ 8,107,245
Smelters.....	\$13,725,398
Refineries.....	\$ 8,578,187
Cost of all materials on hand, supplies, finished products and ore or dump.....	\$10,467,385
Cash, trading and operating accounts and bills receivable.....	\$ 4,062,590
Total Capital Employed.....	\$44,940,805

Distribution of Ownership.—At the end of 1921, about 88 per cent of the total par valuation of the stocks, bonds and other securities issued by the joint stock companies controlling the copper-nickel industry in Canada was held by residents of the United States and Great Britain, 5 per cent was held in Canada, and the balance in various other lands. The total par value of the issued securities amounted to \$100,259,467. Table 208 gives an analysis of these investments, and shows the nature of the securities as well as the amounts held by residents of different countries, but does not include \$150,005 worth of stock which was issued by three undeveloped nickel-copper companies, and which was owned in Canada.

Par Value of Securities, Issued by Joint Stock Companies in the Nickel-Copper Industry showing the Distribution of Ownership as at December 15, 1921

TABLE 208

Security	Held by Residents of				Total Par Value of Issued Securities
	Canada	Great Britain	United States	Other Countries	
	\$	\$	\$	\$	\$
Stocks.....	1,211,686	24,021,606	45,049,700	2,868,610	73,151,602
Bonds.....	3,020,936	19,218,823	754	306,152	22,546,665
Other Securities.....	926,139	66	.....	3,634,995	4,561,200
Total.....	5,158,761	43,240,495	45,050,454	6,809,757	100,259,467
Percentage of total.....	5.14	43.1	44.9	6.76	100

Properties and Production.—Table 209 classifies the data in connection with the nature and size of the mine workings, the ore mined, man-days' work performed, and wages paid in 1921.

Nickel-Copper Mines, 1921

TABLE 209

Number of mines.....	8
Shafts in operation.....	7
Total length of underground workings.....	105,200
Ore mined (short tons).....	*262,593
Days in operation.....	621
Total man-days' work done:	
Surface.....	64,518
Underground.....	71,463
Wages paid.....	†\$615,911

* Includes ore from Bruce Mines.

† Does not include \$8,940 paid for ore sorting work.

Two dressing or sorting works were operated in 1921. The British America Company passes its ore through a sorting house, and in 1921 this company paid \$8,940 in wages and sorted 64,881 tons from which 45,366 tons was shipped to the smelters. The Mond Company crushes and concentrates a limited amount, some 26,578 tons being handled in 1921, from which 7,420 tons of concentrates was produced and sent to the smelter. In the present report, the data regarding crushing operations by the Mond have been included with the smelter statement.

The total shipments of ore from the mines to the smelters amounted to 262,593 tons containing 9,701,948 pounds of copper, 13,991,604 pounds of nickel with small amounts of gold, silver and platinum. The average content per ton of ore was 32 pounds of copper or 1.6 per cent, and 56 pounds of nickel or 2.8 per cent.

Output from Nickel-Copper Mines and Smelters, 1921

TABLE 210

Ore mined (a).....	Tons	262,593
Ore shipped.....	"	262,593
Contents of ores, etc., shipped:		
Copper.....	Lb.	9,491,327
Nickel.....	"	13,991,604
Ore concentrates treated at smelters.....	Tons	393,768
Matte produced.....	"	19,497
Contents of Matte:		
Copper.....	Lb.	12,645,391
Nickel.....	"	19,256,900

(a) Includes ore from Bruce Mines.

Output from Nickel-Copper Refineries, 1921

TABLE 211

		Quantity	Value
			\$
Matte received.....	Tons	6,648	
Matte treated.....		5,558	
Products made—			
Refined nickel.....	Lb.	1,583,600	554,260
Nickel shot and ingots.....	"	3,835,574	1,267,657
Nickel oxide.....	"	7,812,673	1,582,066
Nickel castings.....	"	14,522	5,896
Converter and refined copper.....	"	2,926,407	330,084
Gold.....	Fine ozs	179	3,700
Silver.....	"	8,818	5,525
Platinum.....	"	269	20,184
Palladium.....	"	591	38,267
Iridium and rhodium.....	"	56	9,690
Total Value.....			3,817,329

Employees and Salaries—The data in connection with salaried officials actively engaged in the works are shown in the next table, and are compiled to show the numbers engaged in each section of the industry. It should be noted that there were in operation seven mines, three smelters and two refineries and owing to the fact that these sections were not run continuously throughout the twelve months it is impossible to use the data for purposes of comparison. The total salaries paid to employees were: Mine, \$109,385; Smelters, \$242,790; and Refineries, \$150,816. A total of 195 persons were employed.

Salaried Employees by Classes, and Salaries Paid in the Nickel-Copper Industry, 1921

TABLE 212

	At the Mines		At the Smelters			At the Refineries		
	Male	Salaries paid	Male	Female	Salaries paid	Male	Female	Salaries paid
Superintendents, managers, etc.....	11	\$ 55,010	9		\$ 61,590	12		\$ 49,798
Technical employees:								
Engineers, surveyors, chemists, draughtsmen, etc.....	7	\$ 15,302	16		\$ 50,920	29		\$ 70,882
Clerks, stenographers, etc.....	21	\$ 39,073	49	4	\$ 130,280	30	7	\$ 30,136
Total.....	39	\$ 109,385	74	4	\$ 242,790	71	7	\$ 150,816

Wage-earners, Wages Paid and Time in Operation—The total number of man-days' work done in 1921 has been tabulated for each of the various sections. The greatest number of individual days' work was performed in the smelting division, the total being 217,088 man-days for which \$953,582 was paid. The other sections in order were: mines, 135,981 man-days, and wages, \$615,911; refineries, 93,595 man-days, wages paid \$401,541. The average daily rate of earnings was in the same order as above, smelters, \$4.39 per man-day; mines, \$4.52 per man-day; refineries, \$4.29 per man-day. The total man-days' work done in the whole industry was 448,841, for which \$1,979,273 was paid in wages, making the average earnings in this industry \$4.41 per man-day. The table follows:—

Work Done and Wages Paid by Months in the Nickel-Copper Industry in Canada in 1921

TABLE 213

Month	Mine Statistics			Mill Statistics		Smelter Statistics		Refinery Statistics	
	Total "Man-days" Work Done		Total Wages Paid	Total "Man-days" Work Done	Total Wages Paid	Total "Man-days" Work Done	Total Wages Paid	Total "Man-days" Work Done	Total Wages Paid
	Surface	Under-ground							
			\$		\$		\$		\$
January.....	6,934	16,108	114,514	1,166	4,782	32,858	150,158	16,771	74,711
February.....	7,252	10,870	87,661	1,011	4,158	29,295	131,890	15,713	70,117
March.....	5,497	5,440	50,000			17,988	80,773	14,325	63,748
April.....	5,558	5,181	48,174			16,988	76,494	7,463	34,801
May.....	4,891	4,971	44,563			17,151	73,708	6,125	25,242
June.....	5,202	5,367	47,169			17,450	76,200	7,149	29,696
July.....	5,058	4,660	42,981			17,537	76,881	6,218	25,345
August.....	5,492	4,806	45,886			19,174	83,709	6,718	27,332
September.....	4,804	3,738	37,886			12,832	57,328	4,102	16,422
October.....	4,725	3,644	33,990			12,147	51,395	3,653	13,721
November.....	4,547	3,475	32,255			11,970	48,525	3,198	12,171
December.....	4,558	3,203	30,832			11,698	46,521	2,160	8,235
Total.....	64,518	71,483	615,911	2,177	8,940	217,088	953,582	93,595	401,541

Fuel Used in the Industry—The centralization of this industry in the province of Ontario necessitated the use of imported fuel almost exclusively. Of the total fuel bill of \$974,057, only \$22,958 was expended for domestic fuel. The largest items were those for coke and bituminous coal used in smelting. The total coke used for smelting and refining was 40,534 tons valued at \$625,798, laid down at the plant. The smelting and refining sections used a much larger amount of fuel than did the mining and milling, the comparative figures being \$925,761 for the former and \$48,296 for the latter. The table follows:—

Fuel Used in the Mines, Mills, Smelters and Refineries in the Nickel-Copper Industry in Canada, 1921

TABLE 214

Kind	Unit of Measure	Mines and Mills		Smelters and Refineries	
		Quantity	Cost delivered	Quantity	Cost delivered
Coal—			\$		\$
Anthracite.....	Short tons	2,577	30,048	393	6,022
Bituminous.....	“	1,822	19,250	26,619	227,375
Charcoal.....	Bush.			41,496	13,201
Coke.....	Short tons	92	1,508	40,534	625,798
Gasoline.....	Imp. gals.	303	121	24,093	5,753
Fuel oil.....	“	11,514	1,511	531,853	44,466
Wood.....	Cords	30	113	654	3,146
Total.....			52,551		925,761

Total cost of all fuel used..... \$978,312

Power Equipment.—The power equipment such as boilers, motors, and generators installed in the nickel-copper industry is much greater in power and later in design than that used in any other section of mining and metallurgy in Canada. As shown in Table 215, a total of 25 boilers with a rated horsepower of 9,534 were in place, sixteen of these installations being mechanically fired. Several of these units were used as reserve power and were not fired during the period. Motors operated largely by purchased power numbered 510, of which 318 were driven by alternating and 192 by direct current. The total rated power of the motors was 41,079 h.p. Of this total, motors, aggregating 34,503 h.p. used alternating current while 6,576 h.p. was operated by direct current. The generators installed numbered 23, of which 4 generated alternating current and nineteen, direct. The 4,747 kilowatts generated by these machines would be equivalent to 6,363 h.p.

The air compressors numbered 18 in the mining section, their average capacity being 1,833 cubic feet of free air, per minute. In the smelting and refining, the total of 18 includes a number of blowing engines, the average capacity being 12,560 cubic feet per minute of free air.

Power Equipment in Nickel-Copper Industry in 1921

TABLE 215

Description	Mining and Milling		Smelting and Refining		Total for the Industry	
	No. of Units	Total H.P. according to manufacturer's rating	No. of Units	Total H.P. according to manufacturer's rating	No. of Units	Total H.P. according to manufacturer's rating
Boilers—						
Fired by hand.....	4	225	5	2,000	9	2,225
Fired mechanically.....	3	1,434	13	5,875	16	7,309
Engines—						
Steam.....	5	2,100	3	1,100	8	3,200
Steam turbines.....			8	9,890	8	9,890
Electric hoists.....	5	1,270			5	1,270
Electric motors—						
Alternating current.....	118	12,325	200	22,178	318	34,503
Direct current.....	3	1,806	189	4,770	192	6,576
Locomotives—						
Steam.....	1		24		25	
Electric.....	15		23		38	
Generators or dynamos—		Total capacity		Total capacity		Total capacity
Alternating current.....			4	850 K.W.	4	850 K.W.
Direct current.....	8	1692 K.W.	11	2,205 K.W.	19	3,897 K.W.
Air compressors—		Average Capacity		Average Capacity		Average Capacity
	18	1,833	18*	12,560	36	7,300
		cu. ft. per min. free air		cu. ft. per min. free air		cu. ft. per min. free air

* Includes blowing engines used in refineries.

Miscellaneous Expenditures.—The miscellaneous expenses for the entire industry totaled \$2,368,749 of which those paid for the smelting and refining amounted to some 73 per cent of the whole. As might be expected the various items do not compare closely on account of the great differences in value of plant and other expenses of operation. The item "Cost of purchased power," is the only one which shows any similarity in both sections.

Consumption of Chemicals.—In the smelting and refining processes considerable quantities of chemicals were used and as a matter of general interest a table has been prepared to show the quantities and values of the principal chemical products consumed by the nickel-copper industry. The tables follow:—

Miscellaneous Expenses Disbursed by Mines and Mills, Smelters and Refineries in the Nickel-Copper Industry in Canada, 1921

TABLE 216

	Mines and Mills	Smelters and Refineries
	\$	\$
Cost of purchased power.....	103,770	142,633
Cost of general supplies.....	245,030	589,316
Royalties.....		57,179
Taxes { Municipal.....	13,398	127,621
Provincial.....	478	2,477
Dominion.....		42,243
All other sundry expenses.....	278,360	768,526
Total.....	641,036	1,729,995

three silver smelters in Ontario, treating such ores. A considerable tonnage was also exported to American smelters; in the latter case no payment was made for any cobalt or nickel contained in the product shipped.

During 1921, eighteen companies were active and twenty-two mines were operated. In addition eight idle mines made small shipments of ore from their dumps or of crude bullion recovered in previous years. Of the operating companies in the Cobalt area, the largest producer of ore was the Coniagas Mining Company operating the Coniagas mine and the neighbouring Tretheway; these two mined 117,784 tons. Other important mines were the Nipissing, 80,720 tons; Mining Corporation of Canada, 72,650 tons; and the O'Brien, 54,046 tons. The Miller Lake-O'Brien in Gowganda and the Bailey Silver Mines at Cobalt, each mined over 10,000 tons. Eight mills were in operation, the Bailey (a custom concentrator), the Coniagas, Hudson Bay, O'Brien, Miller Lake-O'Brien, Keeley; and the mills of the two reduction plants belonging to the Nipissing and the Mining Corporation.

Silver-Cobalt-Nickel Mines in Canada, 1921

Name of Company	Name of Mine	Location of Mine	
		Township	District
<i>Producing Mines—</i>			
Aladdin Cobalt Co., Ltd.....	Aladdin.....	Coleman.....	Temiskaming
Bailey Silver Mines, Ltd.....	Bailey.....	".....	"
Beaver Consolidated Mines, Ltd.....	Beaver.....	".....	"
Mining Corporation of Canada, Ltd.....	Foster.....	".....	"
" " ".....	Townsite.....	".....	"
" " ".....	City of Cobalt.....	".....	"
" " ".....	Townsite Extension.....	".....	"
Cobalt Silver Queen, Ltd.....	Silver Queen.....	".....	"
Coniagas Mines, Ltd.....	Coniagas and Old Trethe- way.....	".....	"
Hudson Bay Mines, Ltd.....	Hudson Bay.....	".....	"
Kerr Lake Mining Co., Ltd.....	Kerr Lake.....	".....	"
Dominion Reduction Co., Ltd.....	Dominion.....	".....	"
Nipissing Mining Co., Ltd.....	Nipissing.....	".....	"
Keeley Silver Mines, Ltd.....	Keeley.....	South Lorrain..	"
Tretheway Silver Cobalt Mine, Ltd.....	Castle.....	Haultain.....	"
M. J. O'Brien, Ltd.....	O'Brien.....	Coleman.....	"
La Rose Mines, Ltd.....	La Rose.....	".....	"
Penn Canadian Mines, Ltd.....	Penn Canadian.....	".....	"
McKinley-Darragh-Savage Mines, Co.....	McKinley-Darragh-Savage..	".....	"
Canadian Casey Cobalt Mfg. Co.....	Casey Cobalt.....	Casey.....	"
Horace F. Strong.....	Frontier.....	South Lorrain..	"
Regent Mines, Ltd.....	Regent.....	James.....	"
Crown Reserve Mining Co., Ltd.....	Crown Reserve.....	Coleman.....	"
Camburn Silver Mines, Ltd.....	Camburn.....	".....	"
Frank Cassie.....	Penn Canadian.....	".....	"
Colonial Mining Co., Ltd.....	Colonial.....	Coleman.....	"
Gilmour and Benson Syndicate.....	Silver Leaf Dump.....	".....	"
Chitty and Johns.....	Ophir Dump.....	".....	"
M. J. O'Brien, Ltd.....	Miller Lake-O'Brien.....	Gowganda.....	"
<i>Operating but Non-Producing Mines—</i>			
Oxford-Cobalt Mines, Ltd.....	Oxford Cobalt.....	Gillies.....	"
Victory Silver Mines, Ltd.....	Victory.....	Coleman.....	"
Ruby Operative Cobalt Mines, Ltd.....	Ruby.....	Buck.....	"
Dickson Creek (Cobalt) Silver Mines, Ltd..	Dickson Creek.....	Buck.....	"
F. Howard Collins.....	Collins.....	Nicoll.....	"
Alphine Silver Mines, Ltd.....	Alphine Silver.....	Gowganda.....	"
Federal Mining Co.....	Federal.....		Thunder Bay

The following tables may be useful in comparing this industry with others of the metallic group. In Table 218 the distribution of ownership indicates that, like gold mining in Ontario, the industry was over seventy per cent Canadian-owned, at the end of 1921. The capital invested in producing mines totalled

\$30,878,928 for twenty companies, which was proportionally much below the \$28,752,321 for eleven mines in gold mining in the same province. The number of wage-earners averaged 1,074, of which 208 were surface workers on mining duty, 591 were underground, and 275 were employed in the mills. The average wages paid as computed in Table 222 showed that the miners received \$4.40 per day and mill-workers, \$4.34. The average quantity of ore mined per man in 1921 was 499 tons in this industry as against 868 tons per man in gold-mining in Ontario.

**Actual Capital Employed, and Distribution of Issued Securities,
Silver-Cobalt Mines, 1921**

TABLE 218

Number of Companies	Actual Capital Employed	Par value of Securities issued by Incorporated Companies and held by residents of				
		Class of Security	Canada	Great Britain	United States	Other
			\$	\$	\$	\$

SHIPPING MINES

*22.....	30,878,928	Stocks.....	36,210,667	5,859,026	8,647,015	646,879	51,363,587
		Bonds.....	45,000		140,000		185,000
		Total.....	36,255,667	5,859,026	8,787,015	646,879	51,548,587
Percentage of total.....			70.3%	11.3%	17.1%	1.3%	100%

OPERATING BUT NOT SHIPPING MINES

7.....	319,490	Stocks.....	3,727,219	66,365	188,552		3,982,136
--------	---------	-------------	-----------	--------	---------	--	-----------

IDLE MINES

26.....	7,791,335	Stocks.....	12,884,948	167,240	5,814,164	26,812	18,893,164
---------	-----------	-------------	------------	---------	-----------	--------	------------

GRAND TOTAL, SILVER-COBALT MINES

55.....	38,989,753	Stocks.....	52,822,834	6,092,631	14,649,731	673,691	74,238,887
		Bonds.....	45,000		140,000		185,000
		Total.....	52,867,834	6,092,631	14,789,731	673,691	74,423,887

*Of these 22 establishments, six leased their properties to individuals or partnerships while one was operated and owned by an individual.

Statistics of Silver-Cobalt Mines Producing in 1921

TABLE 219

Number of mines.....	*32
Shafts in operation.....	25
Average depth in feet.....	253
Total length of underground workings (miles).....	95
Days in operation.....	4,292
Ore mined.....	Tons 398,931
Salaried employees—Male.....	No. 69
Female.....	" 2
Salaries.....	\$ 186,060
Wage-earners—Surface.....	No. 208
Underground.....	" 591
Wages.....	\$1,040,305

*21 mines in operation, 11 making small shipments from stocks of ore mined in other years.

Statistics of Mills and Reduction Works Operated at Cobalt during 1921

TABLE 220

Number of mills and reduction works.....	8
Number of stamps.....	300
Days in operation.....	2,457
Ores concentrated.....	Tons 439,173
Old trailings treated.....	" 20,139
Ores cyanided or amalgamated.....	* 154,277
Bullion recovered.....	Fine ounces 5,499,378
Bullion recovered by direct smelting of nuggets.....	" 3,768
Total bullion recovered.....	" 5,503,146
Bullion shipped or sold.....	5,060,454
Net value of bullion sold.....	\$4,157,983
Salaried employees, Male.....	No. 23
Female.....	" 1
Salaries.....	\$ 54,546
Wage-earners.....	No. 275
Wages.....	\$ 399,839

*This 154,277 tons is included in the item 439,173 tons above.

Shipments of Ores, Concentrates and Residues from the Cobalt Camp in 1921

TABLE 221

Kind	Tons	Gross Value (a)	Net Value (b)	Metallic content paid for		
				Silver	Cobalt	Copper
		\$	\$	fine ozs.	lb.	lb.
<i>To Canadian Smelters—</i>						
Ores.....	431.19	611,970	589,712	833,211	97,100	.....
Concentrates.....	1,726.57	1,369,751	1,284,477	1,970,666	145,066	13,929
<i>To Foreign Countries—</i>						
Ores.....	202	35,181	27,436	45,527	.....	24,257
Concentrates.....	822	292,454	257,204	445,177	(c)	.....
<i>Total Shipments—</i>						
Total ore and concentrates.....	3,181.76	2,309,356	2,158,829	3,294,581	242,166	38,186

(a) Gross value means value of the metals paid for before deducting transportation and treatment charges, and includes exchange premium received.

(b) Net value is actual amount received by operator.

(c) Not paid for.

Work Done and Wages Paid.—In Table 222 the detail is given in connection with operating mines only, regarding man-days, work done and wages paid in the mines and mills. The wages paid by producing mines amounted to \$1,440,144. In addition to this amount seven other mines, while not producing ores, carried on considerable development work, for which they paid \$42,531 in wages. The total wages paid was \$1,482,675.

Time in Operation and Work Done, Operating Silver-Cobalt Mines and Mills, 1921

TABLE 222

Month	Mine statistics			Mill statistics	
	Total man-days work done		Total wages paid	Total man-days work done	Total wages paid
	Surface	Underground			
January.....	5,715	14,165	\$ 97,928	8,061	\$ 38,957
February.....	5,504	12,963	91,235	6,957	33,585
March.....	5,493	10,975	84,915	6,534	31,633
April.....	5,723	10,027	69,689	6,332	26,652
May.....	5,842	13,879	80,591	7,449	31,145
June.....	5,841	14,909	90,942	7,779	32,318
July.....	5,496	14,749	90,426	7,844	32,857
August.....	5,723	17,390	98,633	8,348	35,282
September.....	5,637	20,556	91,875	8,191	34,079
October.....	6,289	16,226	97,163	8,396	35,938
November.....	6,012	15,804	95,622	8,337	34,843
December.....	5,826	15,055	93,817	7,774	32,550
Total.....	69,101	176,698	1,082,836	92,002	399,829
Average Number of Men Employed.	234	612	.....	275	.....

Fuel Used in Operating Silver-Cobalt Mines and Mills, 1921

TABLE 223

Kind	Unit of measure	Quantity	Cost delivered
Coal {Anthracite.....	Short tons	523	\$ 8,150
Bituminous.....		5,000	64,007
Coke.....	"	48	720
Gasoline.....	Imp. gals.	1,674	756
Fuel oil.....		76,888	10,468
Wood.....	Cords	4,153	24,072
Total.....			108,573

Power Employed in Operating Silver-Cobalt Mines and Mills, 1921

TABLE 224

Description	Number of units	Total H.P. according to manufacturers rating
Boilers (all fired by hand).....	24	1,334
Stationary engines (including engines used for hoisting, pumping, etc.)—		
Steam.....	9	304
Oil.....	10	270
Electric motors (alternating current).....	158	5,991
Locomotives (electric).....	8	29
Generators or dynamos—		Total capacity
Alternating current.....	1	56 K.W.
Direct current.....	4	42 K.W.
Air compressors.....	5	Gauge pressure
		693 cu. ft. per min. free air
		90 - 100 lbs.

Daily consumption of compressed air purchased by operating mines, 1,410,093 cubic feet.

Miscellaneous Expenses Disbursed by Operating Silver-Cobalt Mines and Mills, 1921

TABLE 225

Cost of purchased power for mine or mill use.....	\$ 340,324
Cost of all materials and supplies used in the mine or mill.....	\$1,063,680
Royalties paid.....	\$ 34,691
Taxes—	\$
Municipal.....	\$ 28,833
Provincial.....	\$ 31,315
Federal.....	\$ 139,647
All other sundry expenses.....	\$ 160,968
Total Miscellaneous Expenses.....	\$1,799,458

THE SILVER-LEAD-ZINC MINING AND MILLING INDUSTRY

The production of lead and zinc in Canada has been derived in the main from the large silver-lead-zinc deposits of British Columbia. During 1921, fifty-four different mines in this province made shipments varying in weight from the small sample lot of a ton or so to as much as 29,000 tons. Quebec, Ontario and the Yukon were each represented by one shipping mine. The total for the Dominion was therefore, 57 shipping mines.

Quebec—The Tetreault Mine was operated under lease by the Zinc Company, Limited. This property is situated in the county of Portneuf and township of Montauban. The ore deposit is a complex lead-zinc ore carrying gold and silver in small quantities. The ore is milled and concentrated at the mine, the lead concentrates being generally exported while the zinc concentrates receive a slight roast and are then run over magnetic separators to remove the iron. Formerly these zinc concentrates were treated in the zinc oxide plant belonging to the company but in 1921 this plant was partially destroyed by fire and all zinc concentrates since produced have been stored.

Ontario—The Kingdon Mine of the Kingdon Mining, Smelting and Manufacturing Company is situated in Carleton County, Fitzroy Township, near Galetta, Ontario. The ore is a series of calcite veins carrying galena. There is a little zinc-blende present and a very small amount of silver which is not recovered. The ore is milled, concentrated and smelted on the property and the pig lead produced is of a very pure grade.

British Columbia—The fifty-four shippers, a list of which may be found below, are situated mainly in the East and West Kootenays, and produce a variety of ores. The Sullivan Mine, situated near Kimberly, and owned by the Consolidated Mining and Smelting Company, and which is one of the largest zinc mines in the world, produces a zinc-lead ore of which the chief component is zinc. Other deposits are higher in lead and carry silver, and grade down to dry silver ores which are low in lead. The industry is one in which the individual operator has a field for his activities; eighteen individuals owning twenty-one mines, produced and sold ore in 1921, as well as eleven partnerships operating twelve properties. There were sixteen incorporated companies with twenty mines shipping. Most of the capital employed was paid out by the incorporated companies, their investment amounting to sixteen millions of dollars as compared with one million (nearly) by the individual owners and four hundred thousand dollars, by partnerships. The company mines are owned principally by Canadians, as will be observed in the section of the table on distribution of ownership, which shows the par value and distribution of the issued stocks, bonds, etc., of the incorporated companies.

Yukon Territory—During recent years considerable development work has been carried on in the lead-producing mines of the Yukon Territory. In 1913 and 1914 small productions were reported. In 1915, 1916 and 1917 production was considerably increased and extensive work was done in the Mayo area about 125 miles due east of Dawson City. Considerable shipments of very rich silver-lead ore were made in 1915 and 1916 from the Silver King property on Galena Creek. Smaller shipments occurred in 1917 and 1918, and in 1921 a shipment of 2,110 tons was made by the Yukon Gold Company to the Selby Smelter in San Francisco.

The most important deposits were found over a distance of some 60 miles on six isolated and separate hills known as Galena Hill, Mount Haldane, Keno Hill, Stand-To Mountain, Rambler Hill and Mount Cameron. Of these, the most extensive development work has been done on Keno Hill.

Some of the more important mines and claims are Keno Hill, Ltd. (Yukon Gold Co.), the F. W. Bradley interests, Slate Creek Mining Co., on Keno Hill; Silver King Mine on Galena Hill, Silver Lead Mining Co., Mount Haldane; Shamrock Group on Keno Hill; Silver Basin Group, also on Keno Hill. Other important claims are located on Rambler Hill, Stand-To Mountain and Mount Cameron.

The production from this area has been handicapped by lack of transportation facilities, and the consequent high cost of development and supplies. The ore to be shipped is hauled during the winter a distance of 42 miles to Mayo Landing. Upon the opening of navigation the bagged ore is transported in barges down the Stewart to the Yukon River where it is transferred to larger boats and shipped to St. Michael to be there transferred to ocean freighters.

The Mayo Valley Railway, Limited, has been granted a Dominion Charter for the purpose of building a fifty-mile line along the Stewart and Mayo Rivers. The completion of such a road would help considerably in reducing costs. Complete development would of course be obtained by linking up the mining area with the White Horse Pass and Yukon Route at Whitehorse.

With the exception of those in the Yukon and Ontario, the lead-zinc deposits are a more or less complex mixture of galena and zinc-blende carrying silver and gold in varying amounts. These ores are generally milled and concentrated where necessary to separate the zinc sulphide or blende from the galena. In the past the absence of a means for securing treatment of the zinc ores and concentrates in Canada has always been a handicap especially in British Columbia. Formerly zinc ores were shipped at heavy cost to United States zinc smelters where operators were recompensed for the zinc contents, but lost valuable amounts of silver and were penalized for any lead contained in the shipped ores. On the other hand, the presence of zinc in a lead ore makes it refractory when treated for lead and as a result the mine operators suffered a penalty per unit of zinc in their lead ores. Under these conditions the industry in 1921 and prior to that year, experienced many difficulties, which at the time of writing were on a fair way to being entirely eliminated. In recent years the Consolidated Mining and Smelting Company has so improved and developed the electrolytic process for the treatment of zinc ores that it can now offer a schedule of smelter rates under which the mine owner will be enabled to market zinc ores and concentrates and to receive payment for the precious metal contents in addition to the zinc. Any zinc contained in lead ores, or concentrates may continue to be a loss, but the penalty for zinc in lead ores will be lowered and the lead-zinc industry will benefit materially through the ability to market zinc ores and concentrates in Canada.

NUMBER OF OPERATORS, NUMBER OF MINES, CAPITAL INVESTED AND VALUE OF PRODUCT IN THE SILVER-LEAD-ZINC INDUSTRY IN CANADA IN 1921

In Table 226 there is tabulated the character of ownership and the value of the product of each group.

As mentioned above, British Columbia has 54 of the 57 shipping mines in which there was invested at the end of 1921 over 93 per cent of the total for Canada. The net value shown is the value of the ore shipped based on the settlement assay and less all charges for freight and treatment. In the section showing "Distribution of Ownership" of incorporated companies it will be seen that over 75 per cent of the issued stocks, bonds, etc., were Canadian-owned in December, 1921. These companies operated 24 shipping mines and it is probable that if the remaining 33 mines operated by individuals and partnerships were included the percentage of the investment in the lead-zinc industry owned by Canadians would be even higher.

This table gives similar data for mines being developed, but which did not ship ore in 1921 and table (c) covers some 65 idle mines from which returns were received. The total number of lead-zinc mines was therefore 133 in which \$27,436,645 actual capital was invested. The total par value of the issued stocks, bonds and other securities was \$39,512,756 of which over 66 per cent was owned in Canada.

Net Value of Shipments from, and Distribution of Ownership in, the Silver-Lead-Zinc Mining Industry in Canada, 1921

TABLE 226

Province	Net value at ship- ping point of ore shipped	Par Value of Securities Issued by Incorporated Companies and held by Residents of Countries Indicated					
		Security	Canada	Great Britain	United States	Other Countries	Total
<i>(a) SHIPPING MINES</i>							
Quebec, Ontario and Yukon.....	\$	Stocks Bonds Other Securities	\$ 900,000	\$	\$ 490,000	\$	\$ 1,390,000
Total.....	226,500		900,000		490,000		1,390,000
British Columbia.....		Stocks Bonds Other Securities	14,203,227 3,000,000	4,316	4,436,217 50,000	2,603,255	21,247,015 3,050,000
Total.....	1,881,553		17,203,227	4,316	4,486,217	2,603,255	24,297,015
Total for Canada.....		Stocks Bonds Other Securities	15,103,227 3,000,000	4,316	4,926,217 50,000	2,603,255	22,637,015 3,050,000
Total.....	2,108,053		18,103,227	4,316	4,976,217	2,603,255	25,687,015
<i>(b) OPERATING, BUT NOT SHIPPING MINES</i>							
Quebec.....		Stocks Bonds Other Securities	2,215,055		6,550		2,221,605
Total.....			2,215,055		6,550		2,221,605
British Columbia.....		Stocks Bonds Other Securities	822,744	300	2,445,201 12,500		3,268,245 12,500
Total.....			822,744	300	2,457,701		3,280,745
Total for Canada.....		Stocks Bonds Other Securities	3,037,799	300	2,451,751 12,500		5,489,850 12,500
Total.....			3,037,799	300	2,464,251		5,502,350
<i>(c) IDLE MINES</i>							
British Columbia.....		Stocks Bonds Other Securities	4,902,272 15,000 41,079	611,697	2,724,610 20,000 8,433	300	8,238,879 35,000 49,512
Total.....			4,958,351	611,697	2,753,043	300	8,323,391
Total for Canada.....		Stocks Bonds Other Securities	4,902,272 15,000 41,079	611,697	2,724,610 20,000 8,433	300	8,238,879 35,000 49,512
Total.....			4,958,351	611,697	2,753,043	300	8,323,391
<i>TOTAL</i>							
Shipping mines.....	2,108,053		18,103,227	4,316	4,976,217	2,603,255	25,687,015
Operating (development only).....			3,037,799	300	2,464,251		5,502,350
Idle mines.....			4,958,351	611,697	2,753,043	300	8,323,391
Grand Total.....	2,108,053		26,099,377	616,313	10,193,511	2,603,555	39,512,756

Name of Company	Address	Name of Mines
INCORPORATED COMPANIES		
Consolidated Mining & Smelting Co., Ltd.	Trail, B.C.	Sullivan and St. Eugene Highland No. 1
Marsh Mines Developing Co., Ltd.	Spokane, Wash., 617 Peyton Bldg.	Marsh
Providence Mining Co., Ltd.	Box 446, Greenwood, B.C.	Providence
Wallace Mountain Mines, Ltd.	Box 176, Penticton, B.C.	Sally Group
Utica Mines, Ltd.	Kaslo, B.C.	Utica
Standard Silver Lead Mg. Co.	Silverton, B.C.	Standard
Silversmith Mines, Ltd.	Spokane, Wash., Box 1772.	Slocan Star
Taylor Engineering Co. (active for a short time on development work.)	Victoria, B.C.	Dolly Vardon
Rosebery-Surprise Mg. Co., Ltd.	New Denver, B.C.	Bosun
"	New Denver, B.C.	Surprise
Rambler-Caribou Mines, Ltd.	Three Forks, B.C.	Rambler Caribou
North Star Mg. Co., Ltd. (Thompson and McKinney, lease)	Kaslo, B.C.	North Star
New Canadian Metal Co., Ltd.	Riondel, B.C.	Bluebell
Krao-Silver Lead Mg. Co., Ltd.	Kaslo, B.C.	Krao
Victor Silver Leaf Mg. Co., Ltd., operated by Niagara Operating Co. (lessees)	Spokane, Wash., 732 W. 5th Ave.	Victor Group
Florence Silver Mg. Co., Ltd.	Spokane, Wash., 517 Hutton Bldg.	Florence
Echo Silver Lead Mg. Co.	Spokane, Wash., 27 E. Boone Ave.	Echo
McLeod Gold and Silver Mg. Co.	Ainsworth, B.C.	Little Mamie
MINING PARTNERSHIPS		
Green Bros. and Ryan	Kaslo, B.C.	Sliver Bell Mine
Ottawa Mining and Milling Co.	Slocan City, B.C.	Ottawa
McIntosh and Crane	Beaverdell, B.C.	Bell Mine
J. McDougall & Co. (operated by two lessees)	Ainsworth, B.C.	Spokane Trinket
Silver Standard Mining Co.	Vancouver, B.C., 506 Winch Bldg.	Silver Standard
Black Prince and Two Friends Syndicate	Vancouver, B.C., 502 North West Bldg.	Black Prince
The Whitewater Mining Co.	Kaslo, B.C.	Whitewater
Sutherland and McPhee	Beaverdell, B.C.	Castor Fraction
French and Bourne (operated by three lessees)	Sandon, B.C.	Majestic
Henry and Curry	Ainsworth, B.C.	Violet
English Brothers	Kaslo, B.C.	Helen
"	Kaslo, B.C.	Keno
INDIVIDUAL OWNERS		
Clarence Cunningham	Alamo, B.C.	Queen Bess Alamo } Sublet to Idaho } lessees.
James Anderson (operated by 3 lessees)	Kaslo, B.C., Box 122	Ferguson (Silver Cup and Nettie L.)
Jas. Anderson	Kaslo, B.C., Box 122	Ruth Mines
H. E. Forster	Vancouver, 773 Seymour St.	Millic Mack
G. M. Barrett (operated by 4 lessees)	Beaverdell, B.C.	Kakome
A. W. McCune (operated by lessees)	Sandon, B.C.	Freddy Lee
A. W. McCune (operated by lessees)	Ainsworth, B.C.	Skyline
D. B. O'Neill	Slocan City, B.C.	L. T. Group
K. E. Zimmerman	Slocan City, B.C.	Anna Group
J. N. Patton	Silverton, B.C.	Wellington
Chas. G. Olson (operated by 2 lessees)	Ainsworth, B.C.	Grant Mine
Robert Cuning	Sandon, B.C.	Last Chance
Edward Maloney	Penticton, B.C.	Highland Chief
J. H. Chisholm	Kaslo, B.C.	Mohawk
Eric Johnson	Kaslo, B.C.	Jessie Bluebird
W. G. Clark	Sandon, B.C.	Chambers Group
H. T. Twigg	Enderby, B.C.	Redress
R. Randolph Bruce	Invermere, B.C.	Paradise
M. J. Byrne	Sandon, B.C., Box 167	Gem
H. Clever	New Denver, B.C.	Molly Hughes

TONNAGE MINED, UNDERGROUND DEVELOPMENT AND ORES CONCENTRATED

Of the 72 operating mines in the lead-zinc industry, 57 shipped ore while 15 carried on development work only (see Table 227). British Columbia claimed 67 of the properties, Quebec three, while Ontario and the Yukon each reported one active mine.

The total ore mined in Canada was 390,073 tons. In British Columbia 54 mines produced 337,406 tons for which the salaries and wages amounted to \$712,523. Some 27 lessees sublet mines or parts of mines during 1921 and no accounting of wages paid out by them could be made.

In Table 228 the corresponding data relating to concentrating mills are shown. There has been excluded the large concentrator operated at Trail by the Consolidated Mining and Smelting Company where during the year a total of 304,418 tons of zinc-lead ores was treated from which 104,950 tons of zinc concentrates and 43,239 tons of lead concentrates were produced. The data for this mill are included with the metallurgical works in a later section.

Ore Mined and Underground Development in Silver-Lead-Zinc Mines Operating, 1921

TABLE 227

Province	No. of Mines	Shafts in operation	Lengths of Adits or Tunnels	Total Length of Underground Workings	Ore Mined
			feet	feet	tons
<i>Producing—</i>					
Quebec, Ontario, Yukon—Total.....	3	3	.....	9,543	52,667
British Columbia—Total.....	54	8	57,650	290,312	337,406
<i>Non-producing—</i>					
Quebec, British Columbia—Total.....	15	3	10,846	32,363	.....
Dominion Total.....	72	14	68,496	332,218	390,073

Ore Milled by Silver-Lead-Zinc Mines Operating, 1921

TABLE 228

Province	No. of mills	Total capacity in 24 hours	Ore milled	Concen- trates produced
			tons	tons
Quebec and Ontario.....	2	450	50,557	†2,315
*British Columbia.....	6	900	9,543	1,379
Total for Canada.....	8	1,350	60,100	3,694

*Does not include concentrator operated by Consolidated Mining and Smelting Company of Canada at Trail.

†Lead concentrates only.

SHIPMENTS AND DESTINATION OF CANADIAN ORES AND CONCENTRATES DURING 1921

As shown in Tables 229 and 230, the silver-lead-zinc mines of Canada shipped in 1921 a total of 312,758 tons of ore and concentrates having a net value of \$2,177,053 to the mines, of which value over 89 per cent or \$1,950,553 came from British Columbia.

Of the total quantity, 308,322 tons was shipped to Canadian smelters and 4,436 tons to smelters in the United States.

Products Shipped by Silver-Lead-Zinc Mines in Canada, 1921

TABLE 229

	No. of Mines	Product shipped	Quantity shipped	Net value at shipping point	Total metal contents as determined by settlement assay			
					Gold	Silver	Lead	Zinc
Quebec, Ontario and Yukon	3	Lead ore.....	tons	\$	ozs.	ozs.	lb.	lb.
		Lead concentrates.....	2,110	94,000	378,261	2,472,615		
			2,315	132,500	376	37,895	3,422,090	
		Total.....	4,425	226,500	376	415,156	5,894,705	
British Columbia	54	†Lead ore.....	9,415	371,177	1,073	540,493	2,139,709	286,374
		*Lead concentrates.....	1,419	73,636	2	32,725	1,483,202	6,980
		Zinc ore.....	297,241	1,486,597		839,624	58,476,369	98,675,414
		Zinc concentrates.....	165	12,119	8	17,218	20,482	123,679
		Dry ore.....	93	7,024	17	11,213	3,239	
		Total.....	308,333	1,950,553	1,100	1,441,273	62,123,001	99,092,447
Total for Canada	57		312,758	2,177,053	1,476	1,857,429	68,017,706	99,092,447

†Includes 5,506 tons of silver ore (Dolly Varden Mine).

*Includes 44 tons of silver concentrates.

Destination of Shipments from Silver-Lead-Zinc Mines in Canada, 1921

TABLE 230

Product shipped	Tons shipped	Net value value at shipping point	Total Metal Contents as determined by Settlement Assay			
			Gold	Silver	Lead	Zinc
		\$	ozs.	ozs.	lb.	lb.
<i>TO CANADIAN SMELTERS</i>						
<i>—NUMBER OF MINES</i>						
<i>SHIPPING, 50</i>						
Lead Ore.....	8,641	295,530	1,063.0	433,364	1,595,278	282,294
Lead Concentrates.....	2,349	113,241	1.6	28,189	3,397,895	
Zinc Ore.....	297,211	1,486,134	0.3	838,759	58,476,369	98,652,785
Zinc Concentrates.....	28	1,952	8.0	3,875	4,634	11,167
Dry Ore.....	93	7,024	16.8	11,213	3,239	
Total.....	308,322	1,903,881	1,090.0	1,315,400	63,477,415	98,946,246
<i>TO UNITED STATES SMELTERS—NUMBER OF MINES</i>						
<i>SHIPPING, 12</i>						
Lead Ore.....	2,884	169,647	9.9	485,390	3,017,046	4,080
Lead Concentrates.....	1,385	92,895	376.2	42,431	1,507,397	6,980
Zinc Ore.....	30	463		865		22,629
Zinc Concentrates.....	137	10,167		13,343	15,848	112,512
Dry Ore.....						
Total.....	4,436	273,172	386.1	542,029	4,540,291	146,201

SALARIED EMPLOYEES AND SALARIES PAID, AVERAGE NUMBER OF WAGE-EARNERS
WORK PERFORMED AND WAGES PAID

Table 231 classifies the salaried officials in the producing and non-producing groups. Of the 71 persons employed throughout the Dominion as managers, technical employees, and clerks etc. 63 were employed on mine staffs while 8 were mainly engaged in connection with milling. No females were reported as employed. In Table 232 the corresponding data are shown for the wage-earners, both in mines and mills.

**Salaried Employees and Salaries Paid in Silver-Lead-Zinc Mines and
Mills in Canada, 1921**

TABLE 231

	On Mine Pay Roll		On Mill Pay-Roll		Total for Mine and Mill	
	No. Male	Salaries Paid	No. Male	Salaries Paid	No. Male	Salaries Paid
<i>Producing Mines and Mills</i>		\$		\$		\$
Three Mines in Quebec, Ontario, Yukon—						
Managers and Superintendents.....	5	19,750	2	2,487	7	22,237
Technical Employees.....	3	4,685			3	4,685
Clerks, Stenographers, etc.....	7	8,210	4	2,400	11	10,610
Total.....	15	32,645	6	4,887	21	37,532
Fifty-four Mines in British Columbia—						
Managers and Superintendents.....	17	40,649	2	3,314	19	43,963
Technical Employees.....	12	21,201			12	21,201
Clerks, Stenographers, etc.....	13	15,565			13	15,565
Total.....	42	77,415	2	3,314	44	80,729
Fifty-seven Mines in Canada—						
Managers and Superintendents.....	22	60,399	4	5,801	26	66,200
Technical Employees.....	15	25,886			15	25,886
Clerks, Stenographers, etc.....	20	23,775	4	2,400	24	26,175
Total.....	57	110,060	8	8,201	65	118,261
<i>Non-Producing Mines and Mills</i>						
Thirteen in British Columbia,						
Two in Quebec—						
Managers and Superintendents.....	5	5,225			5	5,225
Technical Employees.....						
Clerks, Stenographers, etc.....	1	60			1	60
Total.....	6	5,285			6	5,285
<i>All Operating Mines and Mills</i>						
Three in Quebec—						
One in Ontario—						
Sixty-seven in British Columbia—						
One in Yukon—						
Seventy-two in Canada—						
Managers and Superintendents.....	27	65,624	4	5,801	31	71,425
Technical Employees.....	15	25,886			15	25,886
Clerks, Stenographers, etc.....	21	23,835	4	2,400	25	26,235
Total.....	63	115,345	8	8,201	71	123,546

Average Number of Wage-earners, Work Done and Wages Paid in Silver-Lead-Zinc Mines and Mills, 1921

TABLE 232

Province	No. of Mines	Average No. of Wage-Earners		Man-day's work done		Wages paid
		Surface	Under-ground	Surface	Under-ground	
<i>Producing Mines</i>						\$
Quebec.....	3	25	115	7,796	26,936	148,559
Ontario.....						
Yukon.....						
British Columbia.....	54	187	294	54,676	79,069	631,794
Total.....	57	212	409	62,472	106,005	780,353
<i>Non-Producing Mines</i>						
Quebec.....	2	17	23	2,425	3,013	23,080
British Columbia.....	13					
Total.....	15	17	23	2,425	3,013	23,080
<i>Operating Mills</i>						
Quebec.....	1	54	.....	8,727	.....	37,592
Ontario.....	1					
British Columbia.....	6					
Total for Canada.....	72 mines 8 mills	283	432	73,624	109,018	841,025

FUEL USED, POWER AND MACHINERY INSTALLED

In Table 233 the quantities and values of the different grades of fuel used are shown. Of the total fuel cost of \$78,833 almost half or \$38,545 was incurred by some five properties in Ontario, Quebec and the Yukon. The most costly item was wood for which as much as \$20 per cord was paid in the Yukon. The fuel cost in British Columbia was small, due to cheap water-power available.

Table 234 shows the number of boilers, engines and waterwheels installed, with data regarding motors and generators giving the manufacturers' rating.

In Table 235 is tabulated miscellaneous expenses.

Fuel Used in all Operating Silver-Lead-Zinc Mines and Mills, 1921

TABLE 233

Kind	Unit of Measure	Quebec, Ontario, Yukon		British Columbia		Total for Canada	
		Quantity	Value	Quantity	Value	Quantity	Value
			\$		\$		\$
Coal—							
Anthracite.....	Short Tons	.....	.....	43	441	43	441
Bituminous.....	"	.....	.....	4,155	31,749	4,155	31,749
Lignite.....	"	.....	.....	110	1,145	110	1,145
Coke.....	"	725	5,045	34	409	759	5,454
Gasoline.....	Imp. Gals.	1,000	1,000	2,000	1,000	3,000	2,000
Fuel Oil.....	"	.....	.....	4,600	1,704	4,600	1,704
Wood.....	Cord	2,140	32,990	595	3,350	2,595	36,340
Total.....		.....	39,035	.....	39,798	.....	78,833

Power Equipment in all Operating Silver-Lead-Zinc Mines, 1921

TABLE 234

Description	Quebec, Ontario and Yukon Territory		British Columbia		Total for Canada	
	No. of Units	Total Rated H.P.	No. of Units	Total Rated H.P.	No. of Units	Total Rated H.P.
Boilers—						
Fired by hand.....	4	275	10	925	14	1,200
Stationary engines—(including engines used for hoisting, pumping, etc.)—						
Steam.....	3	100	7	858	10	958
Gas.....			1	60	1	60
Oil.....	1	8	2	40	3	48
Hydraulic turbines or water wheels.....			36	4,188	36	4,188
Electric motors—						
Alternating current.....	28	930	15	610	43	1,540
Direct current.....			14	617	14	617
Locomotives—						
Electric.....			6	150	6	150
Compressed air.....			1	20	1	20
Generators or dynamos—		K.W.		K.W.		K.W.
Alternating current.....	1	75	7	855	8	930
Direct current.....	1	5	8	453	9	453
†Air compressors.....	5	3,035	15	2,444	20	5,479

†Total capacity average M. cu. ft. per min. free air.

Miscellaneous Expenses Incurred by all Operating Silver-Lead-Zinc Mines and Mills, 1921

TABLE 235

	Quebec, Ontario, Yukon.	British Columbia	Total for Canada
	\$	\$	\$
Cost of purchased power for mine or mill use.....	12,030	.....	12,030
Cost of all materials and supplies used in the mine or mill.....	23,150	262,774	285,924
Royalties paid.....	100	17,762	17,862
Municipal tax.....	600	15	15
Provincial tax.....	2,267	30,983	33,250
Federal tax.....	.....	3,687	3,687
All other sundry expenses.....	1,065	94,646	95,711
Total miscellaneous expenses.....	39,212	409,867	449,079

IRON ORE MINING

During 1921 the production and shipments of iron ore fell below those of any of the past 20 years. The detail of the shipments is given in Part One under Iron Ore.

The twenty iron blast furnaces of Canada, 12 of which are located in Ontario and 8 in Nova Scotia are dependent almost entirely on imported ores. This is due to the lack of such high grade ores in Canada as are available in the economic deposits of the United States.

The shipping mines in 1921 were the Magpie Mine, Algoma Steel Corporation, Sault Ste Marie, Ontario; Moose Mountain Mine, Moose Mountain, Limited, Sellwood, Ontario; Wallbridge Mine, T. Wallbridge, Madoc, Ontario; and the Hope Mine, Pacific Coast Steel Company, Texada Island, British Columbia.

The capital actually invested by these companies was reported to be as follows:—

Capital Invested in Mines Producing Iron Ore in Canada, 1921

TABLE 236

Lands, buildings, plant machinery and tools.....	\$4,239,712
Materials on hand.....	\$ 354,808
Cash and trading accounts and bills receivable.....	\$ 9,528
Total.....	\$4,604,048

Respecting the issued stocks, bonds and other securities of these companies, only those of Messrs. Moose Mountain, Limited referred exclusively to mining. Since the Algoma Steel Corporation's main enterprise was the production of pig iron and steel products, the proportion of capital stock used for mining purposes would be small, and no separation could be made.

There was no iron ore mined in Nova Scotia during the period. The Nova Scotia Steel and Coal Company and the Dominion Iron and Steel Company imported hematite ores from Wabana, Conception Bay, Newfoundland, the detail of which is given in the section on iron ore in Part One.

The following companies reported as idle in 1921 have in some cases carried on considerable development work, especially during the war, when shipments of ore were made.

Name of Company	Mine	Location
<i>Quebec</i>		
Baie St. Paul Titanic Iron Ore Co.....	Glen.....	St. Urbain, Charlebois Co.
Manitou Iron Manufacturing Co.....	Manitou.....	
Bristol Iron Company.....	Bristol.....	Bristol, Pontiac County.
<i>Nova Scotia</i>		
Canada Iron Foundries Ltd.....		Annapolis, N.S., and Bathurst, N.B.
<i>Ontario</i>		
Atikokan Iron Co. Ltd.....	Atikokan....	Atikokan, Ontario.
Consolidated Iron and Steel Corporation Ltd.....	Algoma.....	Algoma District.
Nipigon Reserve Iron Co.....	Nipigon.....	Township 28, Range 27, Nipigon Reserve (Jack Pine, Ont.)
Tivani Electric Steel Co.....	Orton.....	Tudor Tp., Hastings Co.
<i>British Columbia</i>		
Puget Sound Iron Co.....	Texada.....	Texada Island.
Hematite Mining Co., Ltd.....	Belchor.....	Nanaimo Mining Division.
North Pacific Iron Mines Ltd.....		Omineca Mining Division.

Distribution of Ownership of Securities Issued by Joint Stock Companies Controlling Iron Mines in Canada, 1921*

TABLE 237

Security	Held by residents of				Total
	Canada	Great Britain	United States	Others	
	\$	\$	\$	\$	\$
Stocks.....	4,685,270	3,425,040	3,785,447	31,540	11,927,297
Bonds.....	2,200,000	549,693	1,009,000		3,758,693
Total.....	6,885,270	3,974,733	4,794,447	31,540	15,685,990

*In this Table the data given, cover all operating and idle joint stock companies controlling iron mining properties except the Loughboro Mining Company which is included under Mica Mining, and the Algoma Steel Corporation which is included in the survey of the iron and steel smelting industry. Includes shares of Moose Mountain Ltd.

During 1921 some 59,509 tons of iron ore valued at \$230,164 was shipped from Canadian mines. Of this amount only 43,208 tons was mined during the year and the balance represented ores mined in previous years. The average number of men employed was 71 and wages paid amounted to \$68,606 during the period.

Capital Invested in Idle Iron Mines in Canada during 1921

TABLE 238

Lands, buildings, plant machinery and tools.....	\$6,254,597
Cost of all materials supplies ore on dumps.....	\$ 28,438
Cash, trading and operating accounts and bills receivable.....	\$ 145,447
Total.....	\$6,428,482

The majority of the prime movers installed in all mines were electrically driven, and some 6,000 h.p. was the maximum which could be derived. Boilers installed totalled 6 with a combined rating of 750 h.p.

Power Employed in all Iron Mines in Canada, 1921

TABLE 239

	Number of Units	Total H.P. according to manufacturers' rating
Electric Motors—		
Alternating current.....	85	5,563
Direct current.....	6	460
Generators or dynamos—		
Direct current.....	5	
Air compressors.....	3	Total capacity 1,400 cu. ft. per min., free air

METALLURGY

As mentioned in the section on Mining and Milling, it was found impossible in several instances to draw any line of demarcation between mining proper, and those operations which were carried on above ground. Many establishments give treatment of one kind or another to the crude ore after it is mined and it has been the custom to consider this preparation for market or for further treatment, as part of the mining operations. As examples, there were mentioned the recovery of gold bullion in Porcupine, and in the milling and reduction operations carried on in the Cobalt district. In these cases the manipulation of the ore after it leaves the mine is so interwoven with the business of mining as to be inseparable.

In a number of instances, however, it has been possible to obtain certain statistics regarding smelting and refining plants in conjunction with mines operated, and the present section has been designed to present in a correlated manner, the principal data furnished by these concerns and by similar plants operated independently of mines, in which the reduction of ores either by fire or by electricity was carried on for the production of the non-ferrous metals or compounds of them.

In 1921, there were in Canada eleven companies of this sort which in normal times operated fourteen plants. Most of the smelting establishments curtailed their operations and in some cases closed down entirely, e.g. the nickel-copper smelters and refineries.

The zinc oxide plant of the Canadian Zinc Oxide Company was idle during most of the period and was partially destroyed by fire in August, 1921. The Antimony Smelting Company in New Brunswick was also idle throughout the twelve months.

The names of the companies with their principal products are as follows:—

BRITISH COLUMBIA

The Consolidated Mining and Smelting Company of Canada, Ltd., Trail, B.C., operating many mines in addition to a large smelter and refineries producing gold, silver, lead, copper, copper sulphate, and zinc;

The Granby Consolidated Mining, Smelting and Power Company, Ltd., Anyox, B.C., operating mines and a copper smelter and producing copper, gold and silver;

ONTARIO

The International Nickel Company of Canada Ltd., Copper Cliff, Ont. operating several mines and a smelter near Copper Cliff and a refinery for matte at Port Colborne, Ontario, producing nickel and compounds of nickel, copper, monel metal and small amounts of the precious metals such as gold, silver, platinum and others of the platinum group;

The Mond Nickel Company operating mines and a smelter at Coniston, Ontario, but shipping the smelter matte to Wales for refining;

The British America Nickel Corporation, Limited, operating mines and a smelter near Sudbury and refining the matte at Deschenes, Que., producing nickel and nickel compounds, copper and some precious metals;

The Coniagas Reduction Company operating a smelter in St. Catharines, Ontario, and producing silver bullion, the metals and oxides of cobalt and nickel, metallic arsenic, white arsenic and copper sulphate;

The Deloro Smelting and Refining Company operating at Deloro, Ontario, smelting cobalt ores and producing silver bullion, metals and oxides of cobalt and nickel, white arsenic, the alloy stellite and insecticides;

Ontario Smelters and Refiners Limited, Chippawa, Ontario, which was a consolidation of the Metals Chemicals, Limited, of Welland, and The Standard Smelting and Refining Company of Chippawa. This organization came into existence early in 1920, and produced silver bullion and many chemical compounds of nickel, cobalt, arsenic, etc., and insecticides;

The Kingdon Mining, Smelting and Manufacturing Company, Galt, Ont., producing a pig lead from galena ores;

The Canadian Zinc Products Company operated their zinc oxide plant for a short time during the year, but it was partially destroyed by fire in August, 1921;

NEW BRUNSWICK

The North American Antimony Smelting Company, Lake George, producing antimony regulus (idle). The company has been reorganized and is now known as the Antimony Products Corporation.

Smelting and reduction works treating only foreign ores, such as the Electro Tin Syndicate, Brantford, Ontario, (idle in 1921); the Shawinigan Electro Metals Co., Shawinigan Falls, P.Q. (idle in 1921), and the Northern Aluminium Co., Shawinigan Falls, P.Q., and all furnaces used in recovering the non-ferrous metals from scrap have been excluded as their activities have been reviewed in the report on the manufactures from non-ferrous metals.

As it is not permitted to publish statistics relating to an industry unless it is represented by three or more companies, it was necessary in some cases to include in one class, plants of different kinds, for instance, copper smelters and refineries with lead and zinc plants.

The groups selected were: The nickel-copper smelting and refining group, comprising three companies which operated three smelting establishments, all in Ontario, and two refineries one of which was in Ontario and the other in Quebec; the silver-cobalt smelters and refineries including three companies engaged in treating silver ores from the Cobalt camp; and the copper-lead-zinc smelters and refineries in which three companies were active, two being in British Columbia and one in Ontario.

It might be pointed out that the tables showing distribution of ownership and capital invested will in part duplicate information already given in the mining section since there was no known basis on which the amounts to be allocated to mining or to metallurgy could be calculated. The data given on nickel-copper smelting and refining, which have already been included in the mining section, are here given separately. Apart from the points just mentioned, the data following relate to the metallurgical industry only.

The distribution of ownership in this industry and the percentage of the total par value of the issued securities held in each country are shown in Table 240. In Table 241, the actual capital invested has been compiled. By applying the percentages shown in Table 240 to the respective totals given in Table 241 as invested in each of the three industries, an approximate estimate may be made of the actual foreign capital invested. These, when totalled show (see Table 242) the ownership of the non-ferrous metallurgical industries in Canada.

Distribution of Ownership of the Securities Issued by the Incorporated Companies operating in the Metallurgical Industry in Canada, 1921

TABLE 240

Security	Par Value of the Issued Securities Held by Residents of				Total
	Canada	Great Britain	United States	Other Countries	
<i>Nickel-Copper Smelters and Refineries, three companies—</i>					
Stocks.....	\$ 1,211,686	\$24,021,606	\$45,049,700	\$ 2,868,610	\$ 73,151,602
Bonds.....	\$ 3,020,936	\$19,218,823	\$ 754	\$ 306,152	\$ 22,546,665
Other Securities.....	\$ 926,139	66		\$ 3,634,995	\$ 4,561,200
Total.....	\$ 5,158,761	\$43,240,495	\$45,050,454	\$ 6,809,757	\$100,259,467
Percentage of Total.....	5.145	43.128	44.9	6.79	100
<i>Silver-Cobalt Smelters, three companies—</i>					
Stocks.....	\$ 1,933,505		\$ 5,025		\$ 1,938,530
Bonds.....	\$ 194,900		\$ 20,100		\$ 215,000
Total.....	\$ 2,128,405		\$ 25,125		\$ 2,153,530
Percentage of Total.....	98.83		1.27		100
<i>Copper, Lead, Zinc, three companies—</i>					
Stocks.....	\$14,283,700		\$12,000,420		\$ 26,284,120
Bonds.....	\$ 3,000,000		\$ 3,991,400		\$ 6,991,400
Total.....	\$17,283,700		\$16,491,820		\$ 33,275,520
Percentage of Total.....	51		49		100
<i>Total—</i>					
Stocks.....	\$17,428,891	\$24,021,606	\$57,555,145	\$ 2,868,610	\$101,874,252
Bonds.....	\$ 6,215,836	\$19,218,823	\$ 4,012,254	\$ 306,152	\$ 29,753,065
Other Securities.....	\$ 926,139	\$ 66		\$ 3,634,995	\$ 4,561,200
Total.....	\$24,570,866	\$43,240,495	\$61,567,399	\$ 6,809,757	\$136,188,517
Percentage of Total.....	18.1	31.7	45.2	5.0	100

The Canada Zinc Company and the North American Antimony Smelting Company were idle throughout 1921 and are not included in the above table or any of the following.

Capital Actually Employed in the Metallurgical Plants of Canada, 1921

TABLE 241

	Nickel-Copper Smelters and Refineries	Silver-Cobalt Smelters	Copper, Lead and Zinc Smelters and Refineries	Total
	\$	\$	\$	\$
Lands, buildings, plant machinery and tools..	22,303,585	1,433,442	31,823,524	55,560,551
Materials on hand, supplies, finished products and ore on dump.....	10,467,385	2,105,786	9,234,445	21,807,616
Cash, trading and operating accounts and bills receivable.....	4,062,590	444,096	812,092	5,318,778
Total.....	36,833,560	3,983,324	41,870,061	82,686,945

Actual Investment in the Metallurgical Industry in Canada by Residents of the Countries Indicated*

TABLE 242

	Canada	Great Britain	United States	Others	Total
	\$	\$	\$	\$	\$
Nickel-Copper.....	1,895,087	15,885,578	16,550,423	2,502,472	36,833,560
Silver smelters.....	3,935,524		47,800		3,983,324
Copper-lead-zinc.....	21,353,731		20,516,330		41,870,061
Total.....	27,184,342	15,885,578	37,114,553	2,502,472	82,686,945
Per cent of total.....	32.87%	19.21%	44.88%	3.04%	100.00%

* The amounts given in this table were calculated by applying the percentages given in Table 240 to the totals given in Table 241.

In Tables 243 and 244 the total salaries and wages paid in the Canadian metallurgical industry have been shown as well as a comparison between the amount of work done in 1921 by the different groups.

The total salaries paid in this industry amounted to \$737,657 of which the highest amount or \$393,606 was paid to 156 officials in the nickel-copper group. The copper, lead and zinc, and the silver-cobalt-nickel groups followed in order with \$232,936 and \$111,115, respectively.

The total amount paid to wage-earners in the same plants was \$3,669,300 but the greatest amount to an individual group was in the copper, lead and zinc group in which \$1,988,711 was paid for 445,279 shifts; nickel-copper followed with \$1,355,123 paid for 310,683 shifts; and the silver-cobalt-nickel group paid \$325,466 for 76,724 shifts. From these figures the average daily rate was computed as \$4.466 per shift in the nickel-copper group, \$4.361 in the combined copper, lead and zinc group, and \$4.242 in the silver-cobalt-nickel metallurgical works.

By comparing the ratio or proportion of salaries to wages, it is found that the lowest occurred in the copper, lead and zinc group and was as \$1 is to \$8.537; for the nickel-copper group it was as \$1 is to \$3.442, and for the silver-cobalt-nickel group the salaries amounted to an even higher ratio namely, as \$1 is to \$2.929. It would appear that, proportionally, the number of highly skilled technical employees in the latter group was greater than in any other.

Salaried Employees in the Metallurgical Industry in Canada, 1921

TABLE 243

Group and Class of Employees	On Smelter Pay-roll			On Refinery Pay-roll		
	Number of Employees		Total Salaries	Number of Employees		Total Salaries
	Male	Female		Male	Female	
<i>Nickel-Copper Smelters and Refineries</i> (Including 3 smelters and 2 refineries)			\$			\$
Superintendents and managers.....	9		61,590	12		49,798
Technical employees: engineers, chemists, draughtsmen, etc.....	16		50,920	29		70,882
Clerks, stenographers, etc.....	49	4	130,280	30	7	30,136
Total.....	74	4	242,790	71	7	150,816
<i>Silver-Cobalt-Nickel Smelters and Refineries</i> <i>Combined</i> (Including 3 companies, Smelters and Refiner- ies combined)						
Superintendents and managers.....	6		27,133			
Technical employees: engineers, chemists, draughtsmen, etc.....	1		1,285			
Clerks, stenographers, etc.....	39	1	82,697			
Total.....	46	1	111,115			
<i>Copper-Lead-Zinc Smelters and Refineries</i> (Including 3 companies)						
Superintendents and managers.....	22		76,584	4		13,115
Technical employees: engineers, chemists, draughtsmen, etc.....	30		54,592	12		23,836
Clerks, stenographers, etc.....	41		60,654	2	1	4,155
Total.....	93		191,830	18	1	41,106
<i>All the Metallurgical Groups</i>						
Superintendents and managers.....	37		165,307	16		62,913
Technical employees: engineers, chemists, draughtsmen, etc.....	47		106,797	41		94,718
Clerks, stenographers, etc.....	129	5	273,631	32	8	34,291
Grand total.....	213	5	545,735	89	8	191,922

Time in Operation, Work Done and Wages Paid in the Metallurgical Industry in Canada, 1921

TABLE 244

Month	Nickel-Copper Smelters and Refineries (Three Smelters and two Refineries)				Silver-Cobalt-Nickel Smelters (Three Companies, Smelters and Refineries combined)	
	Smelter Statistics		Refinery Statistics		Total Man-days work done	Total Wages paid
	Total Man-days work done	Total Wages paid	Total Man-days work done	Total Wages paid		
		\$		\$		\$
January.....	32,858	150,158	16,771	74,711	8,886	36,901
February.....	29,295	131,890	15,713	70,117	7,714	32,787
March.....	17,988	80,773	14,325	63,748	8,529	37,133
April.....	16,988	76,494	7,463	24,801	7,652	32,678
May.....	17,151	73,708	6,125	25,242	7,129	30,555
June.....	17,450	76,200	7,149	29,696	5,839	24,830
July.....	17,537	76,881	6,218	25,345	5,563	24,270
August.....	19,174	83,709	6,718	27,332	6,139	26,619
September.....	12,832	57,328	4,102	16,422	5,134	22,080
October.....	12,147	51,395	3,653	13,721	5,616	23,029
November.....	11,970	48,525	3,198	12,171	4,521	18,690
December.....	11,698	46,521	2,160	8,235	3,952	15,894
Total.....	217,088	953,582	93,595	401,541	76,724	325,466

Month	Copper, Lead-Zinc Smelters and Refineries (Three Companies, three Smelters, two Refineries)			
	Smelter Statistics		Refinery Statistics	
	Total Man-days work done	Total Wages paid	Total Man-days work done	Total Wages paid
		\$		\$
January.....	34,634	153,638	4,960	22,209
February.....	33,138	148,273	4,312	19,141
March.....	34,518	151,014	4,526	20,680
April.....	33,649	149,731	4,650	20,615
May.....	34,501	153,463	4,960	22,380
June.....	33,395	151,260	4,950	22,293
July.....	33,834	153,866	5,084	22,891
August.....	33,830	152,418	5,394	24,416
September.....	29,731	135,739	4,740	21,287
October.....	27,559	120,763	4,681	19,854
November.....	28,940	129,112	4,380	19,270
December.....	29,984	133,310	4,929	21,088
Total.....	387,713	1,732,587	57,566	256,124

In Tables 245, 246, 247 and 248 following, are shown, the kind, quantity and value of the chemicals used, the fuel consumed, the power and machinery employed, and the miscellaneous expenses.

In the first table, giving a total cost in chemicals amounting to \$254,627, the three groups compare closely, with the largest quantity used by the silver-cobalt smelters and refineries, namely, \$96,676; copper, lead and zinc used \$81,905 worth while the nickel-copper industry due to curtailed operations expended only \$76,046 on these commodities. The silver-cobalt smelting and refining showed the most extensive list of commodities used.

During 1921, the cost of fuel was greatest in the copper, lead and zinc group, although under more favourable conditions the nickel-copper group would show much larger fuel consumption. In a total of about four and one-half million dollars which was expended as fuel of all kinds, the copper, lead and zinc

spent \$2,009,371 while cost of fuel for the nickel-copper groups amounted to \$925,761. The silver-cobalt group showed a total cost of only \$162,382. The British Columbia smelters were entirely served by domestic fuel with the exception of gasoline of which they imported 1,475,729 gallons. The Ontario industries on the other hand, due to their location, were almost entirely dependent on foreign fuels.

In the table showing miscellaneous expenses the item "Cost of General Supplies" shows a rather large divergence between the nickel-copper group and the copper, lead and zinc group. This was possibly due to the reduced operations in the former group, its plants having been closed down entirely during a considerable portion of the year, and also to differences in the methods of book-keeping. The total cost of general supplies in the copper, lead and zinc group was more than five times that of the nickel-copper group, but under ordinary conditions this great difference should not occur.

Chemicals Used by Metallurgical Plants in Canada, 1921

TABLE 245

Commodity	Unit	Nickel-Copper Smelters and Refineries		Silver-Cobalt Smelters and Refineries		Copper, Lead and Zinc Smelters and Refineries	
		Quantity used	Cost at plant	Quantity used	Cost at plant	Quantity used	Cost at plant
Aluminium dust.....	pounds		\$	12,161	\$ 6,739		\$
Aluminium plates.....	"					120,353	35,853
Bleaching powder.....	"			255,215	8,438		
Borax.....	"			12,588	1,102		
Limestone.....	tons	541	1,326	695	2,475	17,617	45,804
Caustic soda.....	pounds			250,471	11,414	270	47
Hydrochloric acid.....	"			192	32	1,562	147
Lime.....	"			31,509	184		
Liquid chlorine.....	"			154,000	12,051		
Nitre cake.....	"	7,308,000	38,461				
Nitric acid.....	"	264	58	9,100	853	50	4
Potassium cyanide.....	"			19,325	5,730		
Sulphuric acid.....	"	326,000	4,385	1,336,683	16,258	252	32
Sodium carbonate, crude.....	"	774,005	19,661	793,260	21,910		
Sodium carbonate crystals.....	"	1,576,000	3,942			25	2
Sodium chloride.....	"	1,936,000	7,787				
Sodium nitrate.....	"			17,731	907		
Other chemicals.....	"	936	426		8,583	15	16
Total.....			76,046		96,676		81,905

Fuels Used in Metallurgical Plants in Canada, 1921

TABLE 246

Kind	Unit of Measure	Nickel-Copper Smelters and Refineries		Silver-Cobalt- Nickel Smelters and Refineries		Copper, Lead and Zinc Smelters and Refineries	
		Quantity	Cost Delivered	Quantity	Cost Delivered	Quantity	Cost Delivered
			\$		\$		\$
Coal {Anthracite.....	Short tons	393	6,022				
{Bituminous.....	"	26,619	227,375	5,594	47,785	26,616	230,120
Charcoal.....	Bushels	41,496	13,201	12,445	345	793	264
Coke.....	Short tons	40,534	625,798	7,603	96,389	94,563	1,228,109
Gasoline.....	Imp. gal.	24,093	5,753	142,666	17,863	188,394	43,233
Fuel oil.....	"	531,853	44,466			1,813,760	228,672
Wood.....	Cords	654	3,146			1,547	11,232
Gas, artificial.....	1,000 cu. ft.					862,201	267,741
Total.....			925,761		162,382		2,009,371

Power and Machinery Employed in Metallurgical Industry in Canada, 1921

TABLE 247

	Nickel-Copper		Silver-Cobalt-Nickel		Copper, Lead and Zinc	
	No. of Units	Rated H.P.	No. of Units	Rated H.P.	No. of Units	Rated H.P.
Boilers:						
Fired by hand.....	5	2,000	3	225	6	712
Fired mechanically.....	13	5,875			7	3,878
Engines:						
Steam.....	3	1,100			2	8,000
Steam turbines.....	8	9,890				
Hydraulic turbines or water wheels.....					9	8,400
Electric motors:						
Alternating current.....	200	22,178	23	752	812	47,177
Direct current.....	189	4,770			128	3,437
Locomotives:						
Steam.....	24					
Electric.....	23				44	
Compressed air.....						
Generators or dynamos:						
Alternating current.....	4	KW 850			12	KW 9,180
Direct current.....	11	KW 2,205	3	KW 70	40	KW 15,459
Air compressors.....	18	* 12,560	1	* 80	17	* 762

*Cu. ft. per min. free air.

Miscellaneous Expenses Chargeable to Smelting and Refining Operations in Canada, 1921

TABLE 248

	Nickel-Copper Smelters and Refineries	Silver-Cobalt Smelters and Refineries	Copper, Lead and Zinc Smelters and Refineries	Total for Smelters and Refineries in Canada
	\$	\$	\$	\$
Cost of purchased power.....	142,633	24,786	490,758	658,177
Cost of general supplies.....	589,316	103,845	3,239,240	3,932,401
Royalties.....	57,179	1,287	80,268	138,734
Taxes.....				
Municipal.....	127,621	13,216	28,798	169,635
Provincial.....	2,477		103,112	105,589
Dominion.....	42,243		30,046	72,289
All other sundry expenses.....	768,526	60,352	536,143	1,365,021
Total.....	1,729,995	203,486	4,508,365	6,441,846

Materials Smelted and Products Made.—In Table 250, the average price for the year in a recognized market was used in computing the values except in the case of nickel-copper matte for which, as it was impossible to secure figures from the operators, a value of 10 cents per pound on the copper content and of 25 cents per pound on the nickel content was used.

The total quantities and values given will not agree with those shown in Part One as the mineral production of Canada, since a portion of the metal produced in the smelters was derived from foreign ores treated in Canada, and large amounts of gold and silver, recovered in mining and milling operations, did not pass through the plants described in this section.

It will be observed that the total value given in the table showing products made, is not the net value to the metallurgical companies and therefore cannot be used as a value to be included with the manufacturing industry of Canada. In order to secure such figures it would be necessary to deduct the costs of raw materials used, e.g., ore, concentrates and residues, or in other words the values accruing to the mining and milling industry of these raw materials treated during the period.

Ores, Concentrates, etc., Treated in Canadian Smelters, 1921

TABLE 249

Group	Tons
<i>Nickel-Copper—</i>	
Ores treated.....	393,768
Matte produced.....	19,497
Matte exported for refining.....	10,465
Matte treated in Canadian refineries.....	5,558
<i>Silver-Cobalt-Nickel—</i>	
Ores treated.....	141
Concentrates treated.....	2,005
Residues treated.....	2,994
<i>Copper, Lead and Zinc—</i>	
Copper, ores and concentrates.....	1,016,302
Lead ores.....	8,403
Lead concentrates.....	48,013
Gold ores.....	7,380
Zinc residues.....	32,019
Other ores.....	381
Zinc concentrates.....	106,239

Products Made by the Metallurgical Industry in Canada, 1921

TABLE 250

Item	Unit	Quantity	Value
White arsenic.....	Pounds	3,509,921	\$ 310,627
Cobalt.....	"	22,216	66,648
Cobalt oxide.....	"	216,875	464,112
Mixed oxides.....	"	105,675	113,865
Copper.....	"	36,051,554	4,506,444
Copper sulphate.....	"	548,481	30,166
Gold.....	Fine ozs.	64,879	1,341,168
Iridium.....	"	56	9,520
Lead.....	Pounds	62,333,281	3,579,177
Matte*nickel-copper and silver-copper.....	Tons	14,336	3,902,091
Nickel.....	Pounds	5,458,659	1,835,737
Nickel castings.....	"	14,522	5,896
Nickel oxide.....	"	7,879,055	1,595,508
Nickel sulphate.....	"	3,139	204
Palladium.....	Fine ozs.	591	38,415
Platinum.....	"	269	20,175
Silver.....	"	5,415,128	3,392,794
Zinc.....	Pounds	52,988,000	2,466,591
Residues.....	"	294,497	53,139
Total.....			23,732,277

*Exported, or not refined.

COST OF MATERIALS SMELTED

From the statements of mine operators showing net values received for all ores and concentrates, etc., shipped during the period, it was possible to make a fairly close estimate of the cost to the smelters. For ores, etc., treated by the silver-cobalt smelters an approximate average value per ton was easily found, and with the exception of the nickel-copper no difficulty for any ore was met with. As it was impossible to secure good figures for nickel-copper ore, a nominal value of \$6.00 per ton was used. Where residues passed through various plants from one process to another as at Trail, British Columbia, it was impossible to arrive at close figures, and as the total residues amounted to but a fraction of the commodities treated, they were left out of the compilation. Other residues have had values applied to them, based on their mineral content, where known, or from figures showing receipts from sales.

A tabulation showing approximately the total expenses incurred during 1921 may now be shown.

Summary of Expenditures in Metallurgical Works in Canada, 1921

TABLE 251

	\$
Estimated cost of ores, etc. treated, in silver cobalt-smelters.....	2,150,000
“ “ “ “ “ in nickel copper-smelters.....	2,350,000
“ “ “ “ “ in copper, lead and zinc smelters.....	3,900,000
Total salaries and wages.....	4,406,957
Cost of chemicals used.....	254,627
Cost of fuel.....	3,097,514
Miscellaneous expenses.....	6,441,846
Total expenditures.....	22,600,944

NON-METALLIC MINERAL INDUSTRIES

ASBESTOS

The banner year for the asbestos industry in Canada occurred in 1920, and was followed by a period of extreme depression in the market for this product in 1921. Although mining operations were curtailed only some 30 per cent, the demand for asbestos was very slight.

In the United States, conditions were similar; the production reported was only 50 per cent of the 1920 output. Contrary to the conditions prevailing in Canada and the United States, there was increased activity in the asbestos industry in Rhodesia and the Union of South Africa.

Distribution of the Ownership of Asbestos Companies in Canada, Shipping in 1921

TABLE 252

Security	DISTRIBUTION OF OWNERSHIP				Total
	Par value of securities issued by Incorporated Companies and held by residents of the countries indicated.				
	Canada	Great Britain	United States	Other Countries	
	\$	\$	\$	\$	\$
Stocks.....	19,074,969	1,467,300	7,886,780	82,500	28,511,549
Bonds.....	650,000		40,500		690,500
Total.....	19,724,969	1,467,300	7,927,280	82,500	29,202,049

CAPITAL INVESTED

Under this heading the data tabulated deal only with asbestos companies reporting operations during the years under review. In 1920 the returns did not show the valuation of the lands.

Capital Employed in the Asbestos Industry in 1920 and 1921

TABLE 253

	1920	1921
	\$	\$
Value of lands, buildings, plant machinery and tools.....	*14,722,287	35,348,977
Cost of all materials on hand, supplies, finished products and ore on dump.	4,205,783	4,299,792
Cash, trading and operating accounts and bills receivable.....	2,911,020	1,708,392
Total.....	21,839,090	41,357,161

*Includes only value of buildings, plant machinery and tools.

The average number of days that each plant was in operation as computed from the reports by all producing firms in the asbestos industry in 1921 was; mine, 162 days; mill, 161 days. In the preceding year the average number of days operated by both mines and mills amounted to 173 days.

Labour Statistics, Asbestos Industry in Canada, 1921

TABLE 254

Month	Mine Statistics			Mill Statistics	
	Total Man-Days Work Done		Total Wages Paid	Total Man-Days Work Done	Total Wages Paid
	Surface	Under-ground			
			\$		\$
January.....	30,829	13,297	187,377	24,523	91,391
February.....	35,456	15,756	214,010	26,652	107,925
March.....	41,250	16,744	230,270	26,237	106,881
April.....	31,176	15,798	203,861	27,235	106,518
May.....	23,311	8,616	136,243	19,634	77,267
June.....	21,076	7,475	109,326	16,466	58,799
July.....	17,625	3,962	90,201	13,393	47,145
August.....	15,275	6,776	98,208	13,854	51,578
September.....	15,875	9,434	85,389	12,535	41,493
October.....	14,836	9,139	79,452	11,728	38,361
November.....	15,645	8,782	84,005	12,280	36,504
December.....	14,376	8,326	80,392	11,327	36,810
Total.....	276,730	124,105	1,598,734	215,864	800,672
Average.....	235 days per year	246 days per year	\$3.99 per man per day	244 days per year	\$3.71 per man per day

Salaried Employees in the Asbestos Industry in Canada, 1920 and 1921

TABLE 255

	1920			1921		
	Number		Total Salaries	Number		Total Salaries
	Male	Female		Male	Female	
			\$			\$
Superintendents and managers.....	26	.....	160,308	27	.....	106,960
Technical employees, engineers, etc.....	25	.....	107,273	32	.....	60,391
Clerks and stenographers.....	106	13	172,230	60	5	90,668
Total.....	157	13	439,811	119	5	258,019

Salaried Employees, Mine and Mill, in the Asbestos Industry in Canada, 1921

TABLE 256

	On Mine Pay-Roll			On Mill-Pay-Roll		
	Number		Total Salaries	Number		Total Salaries
	Male	Female		Male	Female	
			\$			\$
Superintendents and managers.....	16	.....	71,180	11	.....	35,780
Technical employees.....	20	.....	36,888	12	.....	23,503
Clerks, and stenographers.....	39	4	61,555	21	1	29,113
Total.....	75	4	169,623	44	1	88,396

Monthly Record of the Number of Wage-earners in the Asbestos Industry in Canada, 1920

TABLE 257

Month	Number	Month	Number
January.....	3,464	July.....	3,696
February.....	3,482	August.....	3,600
March.....	3,592	September.....	3,668
April.....	3,695	October.....	3,746
May.....	3,692	November.....	3,334
June.....	3,796	December.....	3,478

Monthly average for 1920.....	3,606
Monthly average for 1921.....	2,570

The average monthly prices tabulated below have been computed from quotations given in the *Engineering and Mining Journal-Press*, during the year.

Average Monthly Prices of Asbestos by Grades, 1921

(Short Tons)

TABLE 258

Month	Crude No. 1	Crude No. 2	Spinning Fibres	Magnesia and Compressed Sheet Fibres	Shingle Stock	Paper Stock	Cement Stock	Floats Stock
	\$	\$	\$	\$	\$	\$	\$	\$
January.....	2,750	1,700	700	412	130	68	24	12
February.....	2,625	1,700	700	412	130	68	24	12
March.....	2,500	1,700	700	412	130	68	24	12
April.....	2,500	1,700	700	412	130	68	24	12
May.....	2,500	1,700	700	412	130	68	24	12
June.....	2,100	1,562	675	395	126	68	24	12
July.....	1,800	1,350	600	340	122	68	24	12
August.....	1,750	1,125	600	300	122	64	24	12
September.....	1,750	1,050	600	290	122	63	24	12
October.....	1,750	1,050	600	290	122	63	24	12
November.....	1,500	850	430	245	118	59	21	10
December.....	1,250	725	312	245	115	55	20	8.5
Average.....	2,065	1,351	610	347	125	65	24	11.55

Fuel Used in the Asbestos Industry in Canada, 1920 and 1921

TABLE 259

Kind	Quantity	Cost
		\$
Coal:		
Bituminous.....	Short tons	27,610
Anthracite.....	"	1,347
Coke.....	"	7,269
Gasoline.....	Imp. gals.	1,878
Fuel oil.....	"	2,140
Total.....		318,633
Total cost of fuel used in 1920.....		395,976

Power Employed in the Asbestos Industry in Canada, 1920 and 1921

TABLE 260

	Number of Units		Total H. P. according to Mfr's. Rating	
	1920	1921	1920	1921
Boilers—				
Fired by hand.....	43	38	4,145	3,030
Fired mechanically.....	6		475	
Engines—				
Steam.....	17	.9	4,010	2,810
Electric Motors—				
Alternating current.....	294	327	20,714	22,065
Direct current.....	48	41	5,453	4,520
Locomotives—				
Steam.....	15	30		
Electric.....		12		
Generators or Dynamos—				
Alternating current.....		1		7(K.V.A.)
Direct current.....	12	13	384(K.W.)	387(K.W.)
Air compressors.....	25	27		

**Miscellaneous Expenses in the Asbestos Industry in Canada,
1920 and 1921**

TABLE 261

	1920	1921
	\$	\$
Cost of purchased power for mine and mill use.....	494,361	419,056
Cost of all materials and supplies used in the mine or mill.....	2,054,134	1,126,462
Royalties paid.....	125,184	165,462
Taxes—		
Municipal.....	215,088	58,515
Provincial.....		12,134
Federal.....		170,002
All other sundry expenses.....	2,531,792	761,809
Total miscellaneous expenses.....	5,420,559	2,713,440

**Summary of Financial Statistics relative to the Asbestos Industry in
Canada, 1920 and 1921**

TABLE 262

Year	Salaries and wages	Miscellaneous expenses	Fuel	Total expenditures	Total value of production
	\$	\$	\$	\$	\$
1920.....	4,765,305	5,420,559	395,976	10,581,840	14,792,201
1921.....	2,657,425	2,713,440	318,633	5,689,498	4,906,230

An excerpt from the *Engineering and Mining Journal-Press*, April 22, 1922, is given below, showing the average tests on asbestos fibres for various purposes.

Asbestos Tests*

Purpose	Thetford	Black Lake	East Broughton
Long spinning fibre.....	1½-9½-4½-1	3½-8½-2½-1½	1½-9-4½-1
Medium spinning fibre.....	0-8-6-2	0-8-6-2	0-8-6-2
Magnesia pipe covering and compressed sheet.....		0-7-5-4	0-5-8-3
Shingle stocks.....	0-1½-9½-5	0-4-8-4	0-1½-9½-5
	0-0-11-5	0-3-9-4	
Paper and millboard.....	0-0-10-6		0-0-11-5
			0-0-10-6
Cement and roofing.....	0-0-5-11		0-0-5-11
Sands, either of dark pulpy nature; short clean fibre or sandy. (For cement and flooring).....	(a)	(a)	(a)

(a) No test.

* In the Report from the Quebec Bureau of Mines, 1920, page 29, the following description is given of the standard equipment used in testing asbestos:—

"The testing of asbestos, to check the grades and ascertain that their length of fibre corresponds to the specifications or requirements, is standardized. The test is conducted on a one pound sample of asbestos representing the average of a shipment. The testing apparatus consists of a nest of four rectangular trays, 24 inches long, 14 inches wide, and 5 inches deep, closely fitting on top of one another. The bottom of the upper tray, or No. 1, is a screen made of No. 12 S.W.G. wire, with openings ½ inch clear; the second tray is a 4 mesh screen or 4 openings to the lineal inch, No. 16 wire; the third tray is a ten mesh or ten openings to the lineal inch, No. 18 wire; the last or lowest tray has a solid bottom. The nest of four screens is made fast to a frame, to which an eccentric with a throw of ½ inch, gives a movement of 1½ inch travel.

"The 16-ounce sample of asbestos to be tested representing the average of a shipment, is put on the upper tray which is covered. The machine is started at the rate of three hundred revolutions a minute of the shaft of the eccentric, and this is kept going for exactly two minutes. At the end of this time, the asbestos which remains in each tray is weighed accurately and recorded, and this gives the number of the grade of the asbestos. For instance, grade 2, 9, 4, 1 means that of the 16 ounce sample, 2 ounces remained on the ½ inch screen, 9 ounces on the ¼ inch, 4 ounces on the ⅓ inch screen and one ounce went through the latter into the bottom tray. Under normal conditions, the greater the proportion remaining in the upper trays the higher the grade."

Asbestos Companies Reporting Shipments during 1921

Name	Address	Name and Location of Mine
Asbestos Corporation of Canada, Ltd	260 St. James St., Montreal, Que..	{King—Thetford Tp. Beaver—Coleraine Tp. British Canadian. Fraser—Broughton Tp. (idle 1921)
Asbestos Mines, Ltd.....	282 St. Catherine St., Montreal Que.....	Boston—Broughton Tp
Bell Asbestos Mines.....	Thetford Mines, Que.....	Bell—Thetford Tp.
Bennett-Martin Asbestos and Chrome Mines, Ltd.....	Thetford Mines, Que.....	Vimy Ridge—Ireland Tp. Thetford—Thetford Tp.
Black Lake Asbestos and Chrome Co., Ltd.....	282 St. Catherine St., Montreal Que.....	{Union—Coleraine Tp. Imperial—Coleraine Tp. Southwark—Coleraine Tp.
Canada Asbestos and Chrome Co...	Coleraine, Que.....	Canada—Coleraine Tp.
Canadian Johns-Manville Co., Ltd..	450 St. James St., Montreal, Que..	Jeffrey—Shipton Tp.
Consolidated Asbestos, Ltd.....	145 St. James St., Montreal, Que..	Thetford—Thetford Tp.
Federal Asbestos Co.....	145 St. James St., Montreal, Que..	Federal—Thetford Tp.
General Asbestos Co.....	Dominion Express Bldg., Mont- real.....	Poulin—Broughton Tp. {Johnson's—Thetford Tp. } Johnson's—Coleraine Tp. }
Johnson's Company.....	Thetford Mines, Que.....	Maple Leaf—Coleraine Tp.
Maple Leaf Asbestos Corp., Ltd....	Thetford Mines, Que.....	Pennington—Thetford Tp.
Pennington Asbestos Co.....	Thetford Mines, Que.....	Quebec—Broughton Tp.
Quebec Asbestos Corporation.....	East Broughton, Que.....	.....—Coleraine Tp.
Windsor Asbestos Co., Ltd.....	335 Ouellette Ave., Windsor, Ont..	

COAL

Coal mining was carried on in Canada during 1921 in 396 mines which were operated by (1) 79 partnerships, (2) 102 individuals, (3) 168 joint stock companies. The incorporated companies operated 215 mines in all.

The total capital invested in the industry at the close of the year was \$176,991,495 of which \$77,000,000 was invested in Nova Scotia, \$53,000,000 in the mines of Alberta, \$41,000,000 in British Columbia mines, \$3,000,000 in Saskatchewan and over \$1,000,000 in New Brunswick.

The coal mining industry in Canada gave employment during 1921 to more than 30,000 men and the wage bill for the year amounted to \$42,758,471. In addition to this \$3,717,238 was paid to salaried officials numbering 1,600 in all.

Complete detailed statistics relative to coal mining in Canada during the three years 1919-20-21 were published in a report recently issued by the Bureau entitled "Coal Statistics for Canada, 1919-20-21."

Properties.—No complete description of the coal mining properties is available from present records. For the year 1921 certain information was asked for in the annual reports made to the Bureau and summary tables have been prepared, which show the principal details of the information received. Table 263 entitled "Ownership, Area, etc., of Coal Mine Properties in Canada in 1921," shows for each province the area of lands held by coal mining interests together with the total length in feet of all underground workings. All the data given in Tables 263 and 264 were compiled from records received from mines operated during a part or the whole of the calendar year 1921.

Ownership, Area, etc., of Coal Mine Properties in Canada, 1921

TABLE 263

Provinces	Number of Coal Mines				Area of Mining properties	Total length of underground workings
	Operated by Joint Stock companies		Operated by partnerships	Operated by individual		
	No. of mines	No. of Co's.			Acres	Feet
Nova Scotia (bituminous).	53	17	.....	6	59	210,827
New Brunswick (bituminous).....	10	6	1	3	20	13,619
Saskatchewan (lignite).....	5	5	6	38	49	9,493
Alberta, anthracite.....						8,000
" bituminous.....						89,804
" lignite.....						96,561
Total, Alberta....	134	129	72	55	261	194,365
British Columbia (bituminous).....	12	10	.....	.....	12	284,578
Yukon (bituminous).....	1	1	.....	.....	1	552
Total for Canada.....	215	168	79	102	396	713,434
						1,433,331

Distribution of Ownership of Securities Issued by Joint Stock Companies Operating Coal Mines in Canada, 1921

TABLE 264

Place of Incorporation and Type of Security	Held by Residents of				Total Par Value of Issued Securities
	Canada	Great Britain	United States	Other Countries	
	\$	\$	\$	\$	\$
<i>Nova Scotia—</i>					
Stocks.....	40,522,700	576,700	878,500	323,200	42,301,100
Bonds.....	738,000			1,603,500	2,341,500
Other securities.....	4,067,440	508,103	235,282	172,070	4,982,895
Total.....	45,328,140	1,084,803	1,113,782	2,098,770	49,625,495
<i>New Brunswick—</i>					
Stocks.....	727,450	550	700,000		1,428,000
Bonds.....	60,000				60,000
Other securities.....					
Total.....	787,450	550	700,000		1,488,000
<i>Saskatchewan—</i>					
Stocks.....	2,155,741	170,450			2,326,200
Bonds.....		612,840			612,840
Other securities.....					
Total.....	2,155,741	783,299			2,939,040
<i>Alberta—</i>					
Stocks.....	27,521,854	1,684,927	6,115,176	5,377,755	40,699,712
Bonds.....	2,236,230	1,373,649	244,967		3,854,846
Other securities.....	98,040	556,460			654,500
Total.....	29,856,124	3,615,036	6,360,143	5,377,755	45,209,058
<i>British Columbia—</i>					
Stocks.....	5,198,082	5,230,989	14,268,283	55,820	24,753,174
Bonds.....	3,348,393	8,006,141	2,970,500	124,293	14,449,327
Other securities.....					
Total.....	8,546,475	13,237,130	17,238,783	180,113	39,202,501
<i>Yukon—</i>					
Stocks.....	54,000	1,123	392,256		447,379
Bonds.....			75,000		75,000
Other securities.....					
Total.....	54,000	1,123	467,256		522,379
<i>Canada—</i>					
Stocks.....	76,179,827	7,664,748	22,354,215	5,756,775	111,955,565
Bonds.....	6,382,623	9,992,630	3,290,467	1,727,793	21,393,513
Other securities.....	4,165,480	1,064,563	235,282	172,070	5,637,395
Total.....	86,727,930	18,721,941	25,879,964	7,656,638	138,986,473

Financial Statistics.—To satisfy a demand for information regarding the capital employed in the coal mining industry and to permit of comparisons being made without similar statistics for the other basic industries, operators of producing mines were asked to itemize as for the year ending December, 1921, the amounts of capital employed in the operation of their coal mines. The data obtained were tabulated and are presented in Table 265, separation being made to show the amount of capital employed in the operation of the coal mines of the several producing provinces.

The data in Table 264 has reference to the ownership of the stock issued by joint stock companies operating coal mines in Canada during the past year. This table shows the several types of securities represented, together with the par value of the issued shares held by residents of Canada, Great Britain, United States and other countries, as indicating the place of residence of the investors. A second compilation has been made showing the total capital employed or invested in the coal mines in Canada.

One item of the financial statistics asked for in the 1921 survey was the general miscellaneous expenses incurred in operating the coal mines and the

data obtained have been collected in Table 269 which shows for each province the cost to the operating companies of several items such as purchased power, royalties, taxes, etc.

Total Capital Employed in the Coal Mines of Canada, as of December 15, 1921

TABLE 265

	Nova Scotia	New Brunsw'k.	Saskat- chewan	Alberta	British Columbia	Yukon	Canada
	\$	\$	\$	\$	\$	\$	\$
Value of lands, buildings, plant machinery, and tools.....	65,689,588	1,116,769	3,167,125	46,720,095	38,138,653	202,500	154,034,730
Cost of all material on hand, supplies, finished products, and ore on dump.....	6,775,185	39,971	28,479	1,524,904	859,327	1,696	9,229,562
Cash, trading and operating accounts and bills receiv- able.....	5,610,482	208,056	181,008	5,402,497	2,325,160	.....	13,727,203
Total Capital Employed..	77,075,255	1,364,796	3,376,612	53,647,496	41,323,140	204,196	176,991,495

Employees, Salaries and Wages.—Statistics of employment offer a valuable reflection of the progress made in any industry. In the past three years this subject has been given special attention, with the result that the data given in this report for 1921 are more illuminating than the limited figures available for previous years. The average number of employees working in the coal mines of the country had been ascertained for a number of years back, but it is only for 1921 that the work done in coal mines as measured in terms of man-days' work performed has been made available. In Table 266 the data given show the number of salaried employees on the colliery pay-rolls of each province for 1921. In addition to the number of employees in each class by provinces the salaries paid to the group have been shown.

The trend in employment throughout 1920 and 1921 may be observed by reference to Table 267 which shows for each coal producing province and for the Dominion the number of employees on the pay rolls for each month in the past two years. Further analysis embodying the data on days' work done, surface and underground, has been compiled in Table 268, which also shows the total wages paid by months. In future years these data showing the actual number of days' work performed by the colliery employees will prove most valuable for reference and comparison. Presently much of their value is lost owing to the fact that no comparable data exist for previous years. Nevertheless the information as given has a value which makes the table quite worth while. It is not without significance that the average number of days worked during the year by each colliery employee was 254 days for surface employees and 219 for those working underground and that the average for all should be 228 days for the year. The average wage received by each employee on the colliery pay-rolls was \$6.20 per day.

Salaried Employees on Coal Mines Staffs for each Province and for Canada for Year 1921

TABLE 266

		Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia & Yukon	Total for Canada
1 Salaried officers of the Corporation.....	No. Salary	28 \$ 126,080	2 \$ 7,000	3 \$ 11,800	26 \$ 93,250	10 \$ 65,216	69 \$ 303,346
2 General Superintendents and Managers.....	No. Salary	148 \$ 372,399	17 \$ 49,055	14 \$ 44,190	236 \$ 741,256	49 \$ 217,214	464 \$1,424,114
3 Technical Experts, Accountants, etc.....	No. Salary	111 \$ 244,755	6 \$ 11,880	8 \$ 12,821	152 \$ 363,656	76 \$ 207,219	353 \$ 840,331
4 Clerks, Stenographers and Salesmen.....	No. Salary	260 \$ 354,245	9 \$ 10,265	23 \$ 31,529	228 \$ 387,342	167 \$ 306,672	687 \$1,090,053
5 Other salaried employees.....	No. Salary	30 \$ 37,585	.....	.....	23 \$ 21,809	.....	53 \$ 59,394
Total.....	No. Salary	577 \$1,135,064	34 \$ 78,200	48 \$ 100,340	665 \$1,607,313	302 \$ 796,321	1,626 \$3,717,238

The above table includes:—

- (1) 47 female employees in item No. 4 and 8 female employees in item No. 5, making a total of 55 female employees in Nova Scotia.
- (2) 2 female employees in item No. 4, making a total of 2 female employees in New Brunswick.
- (3) 4 female employees in item No. 4 making a total of 4 female employees in Saskatchewan.
- (4) 1 female employee in item No. 1 and 41 female employees in item No. 4, making a total of 42 female employees in Alberta.
- (5) 1 female employee in item No. 1 and 28 female employees in item No. 4, making a total of 29 female employees in British Columbia.
- (6) 2 female employees in item No. 1 and 122 female employees in item No. 4, and 8 female employees in item No. 5, making a total of 132 female employees in the mines of Canada.

Number of Employees engaged in Coal Mining in 1921 by months for each Province and for the Dominion

TABLE 267

Months	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia	Total for Canada
January.....	13,147	412	530	12,014	6,730	32,833
February.....	12,788	410	484	11,362	6,669	31,713
March.....	13,223	356	436	9,251	6,488	29,754
April.....	12,000	354	392	8,384	6,517	27,647
May.....	11,850	409	368	7,069	6,426	26,122
June.....	12,391	411	343	7,711	6,413	27,269
July.....	12,743	470	309	8,639	6,612	28,773
August.....	12,654	491	305	9,907	6,701	30,058
September.....	12,928	473	357	10,473	6,861	31,092
October.....	12,891	487	481	11,402	7,030	32,291
November.....	12,923	573	621	12,067	6,995	33,179
December.....	11,968	539	590	11,945	6,894	31,936
Average.....	12,626	449	435	10,019	6,695	30,222

Number of Employees, Work Done and Wages Paid by Months in the Coal Mines of Canada, 1921

TABLE 268

Month	Number of Employees			Days' Work Done			Total Wages Paid
	Surface	Under-ground	Total	Surface	Under-ground	Total	
January.....	8,823	24,010	32,833	190,044	454,678	644,722	\$ 3,997,332
February.....	8,535	23,178	31,713	169,604	395,321	564,925	3,468,008
March.....	8,156	21,598	29,754	165,982	366,190	532,172	3,328,353
April.....	7,459	20,188	27,647	149,264	310,038	459,302	2,926,064
May.....	7,054	19,068	26,122	146,825	333,652	480,477	2,890,009
June.....	7,254	20,018	27,272	154,257	371,649	525,906	3,254,230
July.....	7,554	21,222	28,776	159,501	387,021	546,522	3,416,104
August.....	7,880	22,181	30,061	180,983	463,415	644,398	4,126,494
September.....	8,041	23,051	31,092	170,878	428,329	599,207	3,777,480
October.....	8,193	24,098	32,291	174,295	443,624	617,919	3,932,673
November.....	8,268	24,911	33,179	185,503	479,386	664,889	3,994,975
December.....	8,026	23,910	31,936	179,363	438,927	618,290	3,646,749
Total.....				2,026,499	4,872,230	6,898,729	42,758,471
Average.....	7,937	22,286	30,223	254 days per year	219 days per year	228 days per year	\$6.20 per day

Miscellaneous Coal Mine Operating Expenses, by Provinces, 1921

TABLE 269

Province	Cost of purchased power for mine use	Cost of all materials and supplies used in or about the colliery	Taxes Paid				All other sundry expenses	Total miscellaneous expenses
			Royalties paid	Municipal	Provincial	Federal		
Nova Scotia.....	\$ 1,757,304	\$ 2,976,801	\$ 584,632	\$ 180,048	\$ 57,949	\$ 35,599	\$ 2,962,028	\$ 8,554,361
New Brunswick.....	24,143	102,412	18,796	3,576	3,323	5,400	38,955	196,605
Saskatchewan.....	1,684	53,976	10,847	7,555	389	2,903	32,826	110,180
Alberta.....	73,335	3,131,099	473,399	100,571	166,652	149,802	1,743,569	5,838,427
British Columbia.....		2,729,506	202,918	12,740	61,895	61,488	453,305	3,521,852
Yukon.....			138					138
Total for Canada.....	1,856,466	8,993,794	1,290,730	304,490	290,208	255,192	5,230,683	18,221,563

Power Employed in Coal Mines of Canada by Provinces for 1921

TABLE 270

	Nova Scotia		New Brunswick		Saskatchewan		Alberta		British Columbia		Total for Canada	
	No. of units	Total H.P. rated	No. of units	Total H.P. rated	No. of units	Total H.P. rated	No. of units	Total H.P. rated	No. of units	Total H.P. rated	No. of units	Total H.P. rated
Boilers—												
Fired by hand.....	184	24,521	19	657	13	1,250	193	23,523	79	11,169	488	61,120
Fired mechanically.....	37	14,316					22	4,810	1	1,200	60	20,326
Stationary Engines (including engines used for hoisting, pumping, etc.)—												
Steam.....	294	56,490	18	558	20	780	255	28,019	83	14,850	670	100,697
Steam turbines.....	12	28,750					6	2,952			18	31,702
Gas.....					1	15	30	333			31	348
Oil.....			1	3			19	1,940			20	1,943
Hydraulic Turbines or Water Wheels.....									2	12,000	2	12,000
Electric Motors—												
Alternating.....	242	18,172	7	185			265	9,901	86	2,476	600	30,734
Direct current.....	4	115			21	299	99	2,415	29	762	153	3,591
Locomotives—												
Steam.....	11		1		1		15		9		37	
Electric.....	4	50			2	60	14	360	16	450	36	920
Compressed air.....							42	2,096			42	2,096
Generators or Dynamos—												
Alternating current.....	19	27,020	1	240			36	8,125	14	9,355	73	44,740
Direct current.....	7	165			7	940	34	30,574	13	818	61	32,497
		Capacity cu. ft. per min. free air		Capacity cu. ft. per min. free air		Capacity cu. ft. per min. free air		Capacity cu. ft. per min. free air		Capacity cu. ft. per min. free air		Capacity cu. ft. per min. free air
Air Compressors.....	39	981,600			1	450	55	107,028	20	33,624	115	1,122,702
Other Equipment:												
Steam shovels.....	4						6		2		12	
Power drills—												
Steam.....	1						4				5	
Compressed air.....	23						27		41		91	
Electric.....	1						2				3	
Other power—												
Steam.....							7				7	
Compressed air.....							155				155	
Electric.....							30				30	
Internal combustion.....					1		1				2	

FELDSPAR

Although feldspar occurs in many deposits throughout Canada, operations in this industry in 1921 were confined principally to the provinces of Ontario and Quebec. Over 90 per cent of the Canadian output was shipped to United States grinding plants in the form of crude spar for use in the ceramic industry. It is essential, therefore, that the deposits operated should have good transportation facilities in addition to being conveniently located to the United States markets.

The feldspar grinding plant at Ashbridges Bay, Toronto, Ontario, was active throughout the year. The Frontenac Floor and Wall Tile Company, Limited, of Kingston, Ontario, erected a plant in 1921 with a capacity of 1,500 tons per year for the purpose of grinding Canadian spar for domestic consumption.

Twenty-two firms reported shipments from Ontario and Quebec quarries in 1921. Of these, perhaps the most outstanding one was the "Derry Mine" near Buckingham, Quebec. This deposit was located in the preceding year and is now considered the most important body of feldspar in Canada.

Complete statistics (covering capital employed, salaries and wages, power equipment and fuel used in this industry) are shown in the following tables.

Capital Employed in the Feldspar Industry in Canada, 1921

TABLE 271

	Value
	\$
Lands, buildings, plant machinery and tools.....	427,310
Cost of all materials on hand, supplies, finished products and ore on dump.....	45,214
Cash, trading and operating accounts and bills receivable.....	12,109
Total capital employed.....	484,633

Salaried Employees in the Feldspar Industry in Canada, 1920 and 1921

TABLE 272

Year	Number			Total Salaries
	Male	Female	Total	
				\$
1920.....	13	3	16	15,778
1921.....	11	1	12	18,223

Wage-earners in this industry were paid a total of \$128,553 during the year, divided as follows: Quebec employees received \$33,084, and those in Ontario, \$95,469. The total number of days the Ontario quarries were operated amounted to 1,522; while the deposits in Quebec were active for a total of 601 days. The days' work done in the former province amounted to 25,150 and in the latter to 10,884.

Time in Operation, Man-days' Work Done and Total Wages Paid in the Feldspar Industry in Canada in 1921, by Months

TABLE 273

Month	Average number of employees	Total Man-Days' Work Done	Total Wages Paid
			\$
January.....	198	4,717	18,079
February.....	187	4,189	15,601
March.....	140	3,053	11,363
April.....	118	2,722	10,015
May.....	105	2,488	9,319
June.....	99	2,266	8,655
July.....	92	2,090	7,628
August.....	85	1,973	7,093
September.....	120	2,883	9,743
October.....	116	2,883	9,611
November.....	166	3,208	10,730
December.....	145	3,542	10,716
Total.....		36,034	128,553
Average.....	131	275 days per man	\$3.57 per man per day

Fuel Used in the Feldspar Industry in Canada, 1921

TABLE 274

Kind	Quantity	Cost Delivered
		\$
Bituminous Coal..... Short tons	165	1,719
Gasoline..... Imp. gals.	30	11
Wood..... Cords	631	2,507
Total.....		4,237
Total cost of fuel consumed in 1920.....		\$6,306

Power Employed in the Feldspar Industry in Canada, 1920 and 1921

TABLE 275

Description	No. of Units		Total rated H.P.	
	1920	1921	1920	1921
Boilers—Fired by hand.....	11	12	320	336
Stationary engines—				
Steam.....	7	12	138	212
Gas.....	1	1	3	4
Air compressors.....	1	3		Capacity 105 cu. ft.
Other equipment—				
Power shovels—steam.....	*	8		
Derricks—steam.....	*	9		

*Data not available.

Miscellaneous Expenses in the Feldspar Industry in Canada, 1920 and 1921

TABLE 276

	1920	1921
	\$	\$
Cost of all materials and supplies used.....	24,246	39,364
Taxes—		
Municipal.....	50	13
Provincial.....		114
Royalties paid.....	1,236	5,722
All other sundry expenses.....	27,004	10,415
Total miscellaneous expenses.....	52,536	55,628

Summary Statistics relating to the Feldspar Industry in Canada, 1917-1921

TABLE 277

Year	Number of operating mines	Average number of employees	Total salaries and wages paid	Total value of production
			\$	\$
1917.....	8	101	55,742	89,826
1918.....	12	143	108,592	112,728
1919.....	12	98	46,870	86,231
1920.....	20	277	152,379	280,895
1921.....	*19	236	146,776	230,754

*23 mines reporting shipments.

List of Firms Reporting Shipments in the Feldspar Industry in Canada, 1921

Name	Address	Location
<i>Nova Scotia—</i>		
Norman MacMillan (owner).....	Lower Stewiacke, Colchester Co., N.S.	Near Beach Hill Settlement, Halifax Co., N.S.
<i>Quebec—</i>		
Buckingham Feldspar Company..	Buckingham, Quebec.....	Derry Tp.
W. G. Masson.....	72 Sparks St., Ottawa, Ont.....	Aylwin Tp.
O'Brien and Fowler.....	Bank of Nova Scotia Bldg., Ottawa, Ont.	Derry Tp.
Bush Winning.....	N. D. de Salette, Quebec.....	Portland Tp.
<i>Ontario—</i>		
Canadian Non-Metallic Minerals, Ltd.	Aylen Lake, Ont.....	Dickens Tp.
Eureka Flint and Spar Co., Ltd...	Verona, Ont.....	Portland Tp.
Federal Feldspar, Limited.....	c/o H. Fisher, Ottawa, Ont.....	Bedford Tp.
Feldspars, Limited.....	103 Bay St., Toronto, Ont.....	Bedford Tp. and Portland Tp.
Feldspar Quarries, Limited.....	60 Front St. East, Toronto, Ont.....	Portland Tp.
Gardner Feldspar Company.....	Hartington, Ont.....	Loughboro Tp.
Industrial Minerals Corporation of Canada, Ltd.	805 Bank of Hamilton Bldg., Toronto, Ont.	Monmouth Tp.
International Feldspar Co., Ltd...	Humber Bldg., Highland Park, Detroit, Mich, U.S.A.	Bedford Tp.
McConnell Consolidated.....	Perth, Ont.....	Bathurst Tp.
North American Feldspar Ltd....	100 King St. W., Toronto, Ont.....	Glamorgan Tp.
O'Brien and Fowler.....	Bank of Nova Scotia Bldg., Ottawa, Ont.	March Tp.
Orser-Kraft Feldspar Ltd.....	563 William St., Buffalo, N.Y., U.S.A.	Bathurst Tp.
Orser and Wilson.....	Perth, Ont.....	Loughboro Tp.
Provincial Feldspar Co.....	33 Richmond St. W., Toronto, Ont...	Sherbrooke South, Tp.
Rock Products Company.....	Nicholas Bldg., Toledo, Ohio, U.S.A.	Bathurst Tp.
Storrington Feldspar Co., Ltd.....	c/o Cunningham & Smith, Kingston, Ont.	Storrington Tp.
Verona Mining Company.....	404 Harrison Bldg., Philadelphia, Pa.	Monteagle Tp.
<i>Mills—</i>		
Feldspar Milling Co., Limited....	33 Richmond St. W., Toronto, Ont....	Toronto, Ont.
Frontenac Floor and Wall Tile Co., Ltd.	Kingston, Ont.....	Kingston, Ont.

GYPSUM

The principal gypsum deposits operated in Canada during 1921, were located in the following centres, Hants and Victoria counties, Nova Scotia; Albert county, New Brunswick; Haldimand county, Ontario; Gypsumville, Manitoba; and in the Lillooet District, British Columbia.

Of the eight firms producing gypsum in the Maritime Provinces, six were controlled by American capital. The output of these six mines was exported in the raw form to the United States, where it was treated in the manufacturing plants owned by the same interests. The remaining two firms mined and calcined their own output, principally for consumption in Canada.

In Ontario and Manitoba, the raw gypsum was used mainly in the manufacture of cement, wall plaster, wall board, fireproof tile and blocks, and plaster of paris. The British Columbia deposit was operated rather as an experiment and the resultant product was sold to the farmers for use on the land.

Operations in this industry were conducted by eleven operators, ten of which were incorporated companies, and one an individual producer in the province of British Columbia.

The latest United States tariff regulations, effective on September 22nd, 1922, provide a duty of \$1.40 per ton on all imported plaster rock or gypsum, ground or calcined.

Number and Distribution of Ownership of Operating Companies in the Gypsum Industry in Canada, 1921

TABLE 278

Province	Number of Companies Operating	Distribution of Ownership					
		Par Value of Securities issued by Incorporated Companies and held by residents of the Countries indicated					
		Security	Canada	Great Britain	United States	Other Countries	Total
			\$	\$	\$	\$	\$
Nova Scotia.....	6	{ Stocks...	172,550	400	698,200	68,350	939,500
		{ Bonds...	50,000		100,000		150,000
New Brunswick.....	2	{ Stocks...	8,400		390,600		399,000
		{ Bonds...					
Ontario.....	1	{ Stocks...	323,600		295,700		619,300
		{ Bonds...					
Manitoba.....	1	{ Stocks...	875,000				875,000
		{ Bonds...					
British Columbia.....	1	{					
		{					
Total.....	11	{ Stocks...	1,379,550	400	1,384,500	68,350	2,832,800
		{ Bonds...	50,000		100,000		150,000

Capital Invested in the Gypsum Industry in Canada in 1921, by Provinces

TABLE 279

	Nova Scotia	New Brunswick	Ontario, Manitoba and British Columbia	Total for Canada
	\$	\$	\$	\$
Lands, buildings, plant machinery and tools.....	879,960	439,099	1,426,328	2,745,387
Cost of all materials on hand, supplies, finished products and ore on dump.....	118,214	113,372	182,999	414,585
Cash, trading and operating accounts and bills receivable.....	410,250	86,550	193,004	689,804
Total investment.....	1,408,424	639,021	1,802,331	3,849,776

Salaried Employees in the Gypsum Industry in Canada, 1921

TABLE 280

	On Mine Pay-roll			On Mill Pay-roll		
	Number of Employees		Total Salaries	Number of Employees		Total Salaries
	Male	Female		Male	Female	
			\$			\$
Superintendents, managers, etc.....	10	1	22,736	10	.....	31,898
Technical employees, engineers, surveyors, chemists, draughtsmen, etc.....	3	.....	6,545	1	.....	2,100
Clerks, stenographers, etc.....	6	2	6,335	1	2	3,300
Total.....	19	3	35,616	12	2	37,298

Number of Employees, Work done and Wages paid by Months in the Gypsum Industry in Canada, 1921

TABLE 281

Month	Mine Statistics				Wages Paid	Mill Statistics			Total Wages Paid (Mine and Mill)
	Average Number of Employees		Days Work Done			Average Number of Em- ployees	Days Work Done	Wages Paid	
	Surface	Under-ground	Surface	Under-ground					
					\$			\$	\$
January.....	425	56	7,350	1,318	31,462	215	5,018	21,303	52,765
February.....	347	78	6,498	1,778	33,068	232	5,153	22,066	55,134
March.....	364	79	6,149	2,059	28,704	219	5,426	23,454	52,158
April.....	334	106	5,344	2,179	26,167	271	6,307	27,734	53,901
May.....	407	97	7,061	1,763	35,154	303	7,018	29,465	64,619
June.....	446	91	8,379	1,614	35,806	305	7,038	29,218	65,024
July.....	442	72	8,743	1,266	29,963	268	6,430	26,279	56,242
August.....	484	76	9,608	1,333	34,336	265	6,611	27,409	61,745
September.....	539	75	10,836	1,512	38,928	270	6,514	26,489	65,417
October.....	541	94	10,709	1,545	39,634	264	6,322	26,442	66,076
November.....	494	65	8,899	1,506	42,228	239	5,714	23,590	65,818
December.....	423	48	7,320	806	27,440	164	3,806	15,298	42,738
Total.....			96,896	18,679	402,890		71,357	298,747	701,637
Average.....	437	78	222 days per year	239 days per year	\$3.49 per day	251	284 days per year	\$4.19 per day	

Average Number of Employees in the Gypsum Industry in Canada in 1921, by Provinces

TABLE 282

Months	Nova Scotia		New Brunswick		Ontario		Manitoba	
	Mine	Mill	Mine	Mill	Mine	Mill	Mine	Mill
January.....	315	15	96	90	46	22	24	88
February.....	231	14	105	73	67	45	22	100
March.....	283	14	61	41	69	46	30	118
April.....	282	15	65	61	80	43	13	152
May.....	305	39	93	89	85	44	21	131
June.....	326	41	93	94	85	43	33	127
July.....	352	43	75	83	60	42	27	100
August.....	395	41	85	78	64	38	16	108
September.....	432	43	100	71	65	49	17	107
October.....	436	46	93	73	84	47	22	98
November.....	403	29	83	67	56	44	17	97
December.....	339	27	86	38	37	41	9	58
Average.....	342	31	86	71	67	42	21	107

Fuel Consumed in the Gypsum Industry in Canada, 1921

TABLE 283

Kind	Unit of Measure	Quantity	Cost delivered
			\$
Bituminous coal.....	Short tons	11,263	105,860
Coke.....	"	360	5,894
Gasoline.....	Imp. gals.	1,122	549
Wood.....	Cords	105	717
Gas, natural.....	M cu. ft.	8,662	3,534
Total.....			116,554

Power Employed in the Gypsum Industry in Canada, 1921

TABLE 284

Description	Number of units	Total rated H.P.
Boilers—Fired by hand.....	17	1,225
Stationary Engines—		
Steam.....	7	1,245
Gas.....	8	76
Locomotives—Steam.....	2	1
Electric Motors—		
Alternating current.....	54	3,918
Direct current.....	16	196
Generators and Dynamos—		
Alternating current.....	1	Capacity 5 K.V.A.
Direct current.....	2	90 K.W.
Air Compressors.....	6	Capacity cu. ft. per min. free air 181 cu. ft.
Other Equipment—		
Power shovels—Steam.....	4	
Power Drills—		
Steam.....	11	
Compressed air.....	1	
Electric.....	5	

Miscellaneous Expenses in the Gypsum Industry in Canada, 1921

TABLE 285

	\$
Cost of purchased power.....	23,876
Cost of all materials and supplies used.....	428,905
Royalties paid.....	495
Taxes—	
Municipal.....	20,941
Federal.....	3,125
All other sundry expenses.....	88,497
Total miscellaneous expenses.....	565,839

Summary Statistics relating to the Gypsum Industry in Canada, 1917-1921

TABLE 286

Year	Number of operating mines	Average number of employees	Total salaries and wages paid	Total value of production
			\$	\$
1917.....	12	774	445,128	881,984
1918.....	8	435	275,312	823,006
1919.....	13	725	380,105	1,215,287
1920.....	11	1,016	955,602	1,893,991
1921.....	11	766	774,551	1,785,538

List of Producing Companies in the Gypsum Industry in Canada, 1921

Name	Address	Location
<i>Nova Scotia—</i>		
Wentworth Gypsum Co., Ltd.....	Windsor, N.S.....	Wentworth, Hants county.
Newark Plaster Company.....	Newark, New Jersey.....	Ottawa Brook, Victoria county.
Iona Gypsum Co., Ltd.....	Iona, C.B., N.S.....	Iona, N.S.
Windsor Gypsum Co.....	Newburgh, N.Y.....	Windsor, Hants county.
Windsor Plaster Co., Ltd.....	Windsor, N.S.....	Windsor, Hants county.
Rock Plaster Corporation.....	40 Rector St., New York, N.Y.	Walton, Hants county.
<i>New Brunswick—</i>		
Albert Manufacturing Company.....	Hillsborough, N.B.....	Hillsborough, Albert county.
Hillsborough Plaster, Quarrying and Mfg. Co.....	Hillsborough, N.B.....	Edgetts Landing, Albert county
<i>Ontario—</i>		
The Ontario Gypsum Co., Ltd.....	Paris, Ont.....	Caledonia, Seneca tp. Lythmore, Oneida tp.
<i>British Columbia—</i>		
L. Burley (now Soda Mining and Products Co., Ltd.).	12 Bank of Hamilton Building, Vancouver.....	Lillooet district.

MICA

The important deposits of mica in Canada are located in the counties of Ottawa and Labelle, in Quebec, and Lanark, Leeds and Frontenac, in Ontario. The product of these mines is, in the main part, shipped first to mica trimming shops, conveniently located, where it is either rough cobbed or split, and trimmed for market and thence exported to United States or Great Britain. During 1921, the mica exported to United States represented 98 per cent of the Canadian production, while the remainder was shipped to Great Britain and other countries.

The principal causes for the falling off in demand for mica may be traced to the decline in the market for automobiles and electrical supplies. This became apparent during the closing months of 1920, when there was a general slackening in the demand for all industrial commodities. While the automobile industry was flourishing, the sale of mica for use in spark plugs, generators, condensers and starters was very brisk.

Twenty operators reported sales of mica during 1921; of this number, fourteen were in Quebec, and six in Ontario. Individual owners predominated, there being only three incorporated companies active in this industry.

Statistics relating to the extensive mica trimming shops in Ontario and Quebec have not been included in this report, but will be treated under a separate heading and made available for distribution in bulletin form.

Capital Invested in the Mica Mining Industry in Canada in 1921, by Provinces

TABLE 287

	Quebec	Ontario	Total for Canada
	\$	\$	\$
Lands, buildings, plant machinery and tools.....	137,080	86,073	223,153
Cost of all materials on hand, supplies, finished products and ore on dump.....	21,654	294,644	316,298
Cash, trading and operating accounts and bills receivable.....	23,933	12,853	36,786
Total investment.....	182,667	393,570	576,237

Salaried Employees.—Four salaried employees were engaged in the operating of mica mines in Quebec and one in Ontario. Salaries paid amounted to \$7,738.

Average Number of Employees, Work done, and Wages paid in the Mica Industry in Canada in 1921, by Provinces

TABLE 288

Month	Quebec			Ontario			Total		
	Average Number of Wage-Earners	Days Work Done	Total Wages Paid	Average Number of Wage-Earners	Days Work Done	Total Wages Paid	Average Number of Wage-Earners	Days Work Done	Total Wages Paid
			\$			\$			\$
January.....	99	2,310	4,835	32	776	2,492	131	3,086	7,327
February.....	105	2,316	4,771	25	536	1,912	130	2,852	6,683
March.....	103	2,467	4,917	30	702	2,328	133	3,169	7,245
April.....	99	2,286	4,909	29	605	1,976	128	2,891	6,885
May.....	102	2,496	5,364	33	730	2,254	135	3,226	7,613
June.....	93	2,127	4,800	31	650	2,050	124	2,777	6,850
July.....	87	2,067	4,128	32	684	2,162	119	2,751	6,290
August.....	43	1,014	2,680	32	736	2,512	75	1,750	5,192
September.....	34	819	2,024	26	572	1,790	60	1,391	3,814
October.....	29	734	1,712	24	497	1,381	53	1,231	3,093
November.....	26	619	1,450	23	528	1,597	49	1,147	3,047
December.....	32	771	1,565	16	336	1,085	48	1,107	2,650
Total.....		20,026	43,155		7,352	23,539		27,278	66,694
Average.....	71	282 days per man per year	\$2.11 per day	28	263 days per man per year	\$3.20 per day	99	277 days per man per year	\$2.44 per day

Fuel Used.—The consumption of fuel in the industry was very small amounting in value to \$750 for Quebec and \$3,604 for Ontario, a total of \$4,354 in all.

Power Employed in the Mica Industry in Canada during 1921, by Provinces

TABLE 289

Description	Quebec		Ontario		Total	
	No. of Units	Total H.P. according to Manufacturer's Rating	No. of Units	Total H.P. according to Manufacturer's Rating	No. of Units	Total H.P. according to Manufacturer's Rating
Boilers— Fired by hand.....	2	55	4	240	6	295
Stationary engines— Gas.....	1	20			1	20
Hydraulic turbines or water wheels.....	1	125			1	125
Electric motors— Alternating current.....	5	110			5	110
Generators and dynamos— Alternating current.....	1	Total capacity 115 K.V.A.			1	Total capacity 115 K.V.A.
Air compressors.....	2	Capacity cu. ft. per min. free air 861	2	Capacity cu. ft. per min. free air 1,408	4	Capacity cu. ft. per min. free air 2,269
Power drills, compressed air.....			4		4	
Hoists, steam.....	2		1		3	

Miscellaneous Expenses Incurred in the Mica Industry in Canada during 1921, by Provinces

TABLE 290

	Quebec	Ontario	Total
	\$	\$	\$
Cost of purchased power.....	50		50
Cost of all materials and supplies used.....	6,041	2,083	8,124
Royalties paid.....	85		85
(Municipal.....)	636	60	696
Taxes: Provincial.....	105	596	701
Federal.....	3,338		3,338
All other sundry expenses.....	2,101	4,648	6,749
Total miscellaneous expenses.....	12,356	7,387	19,743

Summary Statistics relating to the Mica Industry in Canada, 1917-1921

TABLE 291

Year	Number of operators	Average number of employees	Salaries and wages paid	Total value of production
			\$	\$
1917.....	28	283	119,440	358,851
1918.....	16	165	84,521	271,550
1919.....	21	147	109,411	273,788
1920.....	20	186	145,247	376,022
1921.....	20	104	74,432	70,063

List of Operators Reporting Shipments of Mica during 1921

Name	Address	Location (Township)
<i>Quebec—</i>		
Ahearn, W. A.....	538 McLaren St., Ottawa.....	Hull
Blackburn Bros.....	134 Wellington St., Ottawa.....	Templeton
The Capital Mica Co., Ltd.....	538 McLaren St., Ottawa.....	Hull
Hamilton Syndicate.....	80 Elgin St., Ottawa, Ont.....	Templeton
The LaFortune Mining Co.....	Gatineau Pt., Que.....	Templeton
Flynn, H. T.....	106-8 Montcalm St., Hull, Que..	Hull
Gauthier and Gibault.....	Buckingham, Que.....	Portland
Gowan, Wm.....	Holland Mills.....	Portland West
Laurin, Philip.....	Box 105, Gatineau Point, Que....	Wright
The Laurentide Mica Co., Ltd.....	119 Queen St. West, Ottawa, Ont.	East Templeton
Nault, Adolphe.....	River Desert.....	Cameron
Wallingford Bros., Ltd.....	Perkins, Que.....	North Templeton
Winning, Bush.....	N.D. de La Salette, Que.....	Portland
Keene Mica Products Co., Ltd.....	Keene, New Hampshire, U.S.A.	Villeneuve
<i>Ontario—</i>		
Elliott, Wm. M.....	3433 Walnut St., Chicago, Ill....	Butt
Kent Bros. and Estate J. M. Stoness.	Kingston, Ontario.....	Bedford
Kingston and Perth Mining Co.....	Kingston, Ont.....	North Burgess
The Loughborough Mining Co., Ltd.	Sydenham, Ont.....	Loughborough
McLaren, W. L.....	Nevis Cottage, Perth, Ont.....	North Burgess
Tory Hill Marble and Mica Co., Ltd.	Tory Hill, Ont.....	Glamorgan

NATURAL GAS

No records are available prior to 1892, as to the production of natural gas in Canada. An estimate of the value of gas produced during that year was placed at \$150,000.

The extensive developments of the oilfields in Ontario made available for consumption large quantities of natural gas. From 1892 to 1902 inclusive, Ontario was the only contributor of this commodity. In 1903, the first produc-

tion from other provinces was recorded. The value of natural gas produced during 1903 was approximately \$202,000 and from that year there was an increase in production until in 1917, the grand total value was \$5,045,298. In the following years a considerable decrease in valuation was recorded.

A summary of the natural gas industry in Ontario during 1921 is provided in the following excerpt from the report issued by Col. R. B. Harkness, Commissioner of Gas for Ontario:—

"This decrease is due to three causes, viz., (a) Natural decline of the gas fields, (b) A general raise in the rates charged for gas, (c) Drastic regulations that restrict the sale of gas to domestic use only, with a very limited quantity for manufacturing purposes. Although this winter (1921-22) has been, if anything, slightly colder in the gas fields than last winter, a better distribution has been maintained and no complaints have been received of poor service (low pressure) where fault could be found with the operating companies. Field conditions are being improved but in many cases the improvement has come too late. As a result, the Eastern Gas Field (Haldimand and Welland) is very near the end of its long life. Scores of wells must be plugged next year. In Western Field (Kent County) conditions are much better. Here operations have been conducted by large companies with engineers of wide experience in charge. No new gas fields have been discovered, although five "wildcat" wells were drilled during the year, a considerable decrease in valuation was recorded."

Alberta.—The producing fields in this province during 1921 were, the Medicine Hat; Bow Island (about 40 miles west of Medicine Hat); and the Turner Valley gas field (35 miles southeast of Calgary). The total number of wells reported as producing during the year was 64, a similar number as was reported active in 1920. In addition to the fields mentioned previously, wells have also been bored successfully in the Viking gas field situated approximately 80 miles southeast of Edmonton.

New Brunswick.—The producing wells in the province of New Brunswick are confined to the Stony Creek field in Albert County, about eight miles south of Moncton. The natural gas produced is used largely for power, domestic heating and lighting purposes in Moncton. On December 31, 1921, there were twenty productive wells, one well having been exhausted during the year.

Character and Distribution of Ownership of Producing Companies in the Natural Gas Industry in Canada during 1921, by Provinces

TABLE 292

	New Brunswick	Ontario	Manitoba	Alberta	Total for Canada
Number of operators.....	1	87	1	15	104
Character of ownership—					
Individual.....		56	1		57
Incorporated companies.....	1	31		15	47
Distribution of ownership showing the par value of stocks and bonds issued by incorporated companies and held by residents of the countries indicated—					
Canada—					
Stocks.....		7,367,446		5,646,900	13,014,346
Bonds.....				168,300	168,300
Other securities.....				54,624	54,624
Great Britain—Stocks.....		130,599		2,573,400	2,703,999
United States—					
Stocks.....		6,701,978		114,700	6,816,678
Other securities.....				9,145	9,145
Other countries—Stocks.....		4,000			4,000
Total.....		14,204,023		8,567,069	\$22,771,092

Capital Employed in the Natural Gas Industry in Canada, 1921, by Provinces

TABLE 293

	New Brunswick*	Ontario	Alberta	Total
	\$	\$	\$	\$
Lands, buildings, plant machinery and tools.....		13,795,996	12,030,245	25,826,241
Cost of all materials and supplies on hand.....		201,074	392,916	593,990
Cash, trading and operating accounts and bills receivable.....		3,331,687	407,187	3,738,874
Total investment.....	209,373	17,328,757	12,830,348	30,368,478

*Only one company operating.

Salaried Employees in the Natural Gas Industry in Canada, 1921

TABLE 294

	No. of Employees		Total
	Male	Female	Salaries
Superintendents, managers, etc.....	43	.....	\$ 92,374
Technical employees: engineers, surveyors, chemists, draughtsmen, etc.....	6	.....	10,425
Clerks, stenographers, etc.....	41	35	75,100
Total.....	90	35	177,899

Average Number of Wage-earners and Wages Paid in the Natural Gas Industry in Canada, 1921

TABLE 295

Month	Average number of wage- earners	Total wages paid
January.....	602	\$ 48,406
February.....	610	47,542
March.....	614	50,462
April.....	684	53,513
May.....	696	57,142
June.....	737	59,782
July.....	738	60,539
August.....	722	60,399
September.....	729	59,260
October.....	792	63,797
November.....	884	70,513
December.....	925	73,653
Total.....	760*	705,008

*Average.

Power Employed in the Natural Gas Industry in Canada, 1921

TABLE 296

Description	Number of Units	Total Rated H.P.
Boilers—		
Fired by hand.....	9	295
Fired mechanically.....	5	210
Stationary engines—		
Steam.....	16	425
Gas.....	116	2,530
Oil.....	2	10
Electric motors—		
Alternating current.....	8	97
Direct current.....	1	2
Generators or Dynamos—		Total capacity K.V.A.
Alternating current.....	2	145

Miscellaneous Expenses in the Natural Gas Industry in Canada, 1921

TABLE 297

	\$
Cost of purchased power.....	10
Cost of all materials and supplies used.....	113,445
Royalties paid.....	39,033
(Municipal.....)	64,418
Taxes (Provincial.....)	54,485
(Federal.....)	122,947
All other sundry expenses.....	1,010,884
Total miscellaneous expenses.....	1,405,222

Gas Wells in Canada during 1920 and 1921

TABLE 298

	New Brunswick	Quebec	Ontario	Manitoba	Alberta	Total
Productive wells at beginning of year						
1920.....	23	*6	1,872	1	67	1,969
1921.....	21	*6	1,862	1	61	1,954
Number of productive wells drilled.....			93			93
1920.....			105		3	108
1921.....			24		2	26
Number of dry wells drilled.....			21			22
1920.....			117		3	122
1921.....			112			113
Number of wells abandoned.....						
1920.....	21	*6	1,862	1	64	1,954
1921.....	20	*6	1,930	1	64	2,021

*Idle.

Natural Gas Wells in Ontario in 1921, by Townships

TABLE 299

Township	No. of producing wells in operation Dec. 31, 1921	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year
Amabel.....	2			
Aldboro.....		1		
Barton.....	2			
Bayham.....	56	1		1
Bertie.....	97	6		8
Beverly.....			1	
Binbrook.....	71	2	3	6
Caistor.....	50	13		
Canboro.....	158	6		4
Cayuga, North.....	44		3	4
Cayuga, South.....	62	1		
Charlotteville.....	14	1		
Crowland.....	50			3
Dawn.....	1			1
Dover, West.....	8	1	2	1
Dunn.....	20	1		1
Emmiskillen.....	6			
Euphemia.....	6			
Flanboro, W.....			1	
Gainsboro.....	2	1		
Glanford.....	23	3	1	1
Gosfield.....	1			1
Houghton.....	2	3		
Humberstone.....	118	5		
Mersea.....	4			1
Middleton.....	17			2
Missouri, West.....	3			
Malahide.....	1		2	1
Moulton.....	91	2		7
Oneida.....	23			9
Onondaga.....	53	4		
Rainham.....	122	9		
Raleigh.....	24	3		1
Romney.....	95	2		
Sarnia.....	25			
Seneca.....	161	7	3	23
Sherbrooke.....	14	1	1	2
Tilbury, East.....	147	13	1	12
Wainfleet.....	55	1		
Walpole.....	157	16	2	4
Walsingham, North.....	6			2
Walsingham, South.....	15			1
Windham.....	5			
Willoughby.....	51	4	1	
Woodhouse.....	63	4		3
Total.....	1,930	112	21	105

Summary Statistics relating to the Natural Gas Industry in Canada,
1917-1921

TABLE 300

Year	Number of operators	Average number of employees	Salaries and wages paid	Total value of production
			\$	\$
1917.....	105	597	520,290	5,045,298
1918.....	101	711	641,542	4,350,940
1919.....	99	681	631,567	4,176,037
1920.....	104	616	643,320	4,232,642
1921.....	103	885	882,907	4,594,164

PETROLEUM

The production of petroleum in Canada dates back to 1857, when a shallow well was dug near Enniskillen (now known as Oil Springs), in the province of Ontario.

Early in January, 1862, a pioneer oil prospector brought in the first flowing well at Oil Springs, Ontario, and before the fall of the same year there were approximately 35 producing wells in operation. According to information available some of these wells produced from 3,000 to 6,000 barrels per day.

In 1865, Petrolia came into existence as a large producer and since that date has maintained its position among the leading oil fields in Canada. Prior to this discovery, oil deposits were located in Kent county, at Bothwell.

Although it will be seen by the foregoing that Petrolia, Oil Springs and Bothwell are by far the oldest producing fields in Canada, a survey of the 1921 production figures will show that these three fields continue to rank as the premier producers in this country.

The first attempt to develop the oil deposits in Westmoreland County in New Brunswick, was made in 1859. The four wells drilled then were not successful as fresh water seeped in, ruining them. No further drilling was attempted until 1879, when two more wells were sunk, one at St. Joseph and the other at Dover. From 1900 to 1906 some seventy-two wells were drilled. The distribution of this number was as follows: 67 in Westmoreland county, 4 in Albert county and one in Kent county. This marked the opening up of the present Stony Creek oil and gas field.

In May, 1914, considerable interest was taken in the Turner Valley oil field in Alberta. The centre of this field is about 25 miles south of Calgary. Since 1914 operations have been carried on in this district by some five companies.

The new oil fields in the Mackenzie district of the North-West Territories have been the scene of considerable activity during the past several years. The Imperial Oil Company commenced drilling operations in this district, about 40 miles below Fort Norman, early in 1920.

Tables 301 to 306 inclusive do not contain any data regarding New Brunswick wells as these have been included under "Natural Gas."

Character and Distribution of Ownership of Producing Companies in the Petroleum Industry in Canada during 1921, by Provinces

TABLE 301

	Ontario	Alberta	Total for Canada
Number of operators.....	115	5	120
Character of ownership—			
Individual.....	102	.....	102
Incorporated companies.....	13	5	18
Distribution of ownership showing the par value of stocks issued by incorporated companies and held by residents of the countries indicated—			
Canada.....	\$ 2,621,522	\$ 767,400	\$ 3,388,922
Great Britain.....	7,050	.....	7,050
United States.....	2,214,348	668,341	2,882,689
Total.....	4,842,920	1,435,741	6,278,661

Capital Invested in the Petroleum Industry in Canada in 1921, by Provinces

TABLE 302

	Ontario	Alberta	Total for Canada
	\$	\$	\$
Lands, buildings, plant machinery and tools.....	1,797,746	1,111,968	2,909,714
Cost of all materials on hand, supplies and finished products....	19,766	19,997	39,763
Cash, trading and operating accounts and bills receivable.....	44,710	219,972	264,682
Total investment.....	1,862,222	1,351,937	3,214,159

Salaried Employees in the Petroleum Industry in Canada during 1921, by Provinces

TABLE 303

—	Ontario		Alberta		Total for Canada		
	Num- ber of Em- ployees	Total Salaries	Number of Employees	Total Salaries	Number of Employees		Total Salaries
					Male	Female*	
		\$		\$			\$
Superintendents, managers, etc.....	7	11,930	6	16,858	10	3	28,788
Technical employees, en- gineers, surveyors, chem- ists, draughtsmen, etc....	1	772	.....	.....	1	.....	772
Clerks, stenographers, etc..	2	970	3	1,349	3	2	2,319
Total.....	10	13,672	9	18,207	14	5	31,879

*In Alberta only.

Time in Operation, Work done and Wages paid in the Petroleum Industry in Canada during 1921, by Provinces

TABLE 304

Month	Ontario		Alberta		Total for Canada	
	Average number of wage earners	Total wages paid	Average number of wage- earners	Total wages paid	Average number of wage- earners	Total wages paid
		\$		\$		\$
January.....	150	13,652	13	1,311	163	14,963
February.....	152	12,512	14	1,525	166	14,037
March.....	150	13,433	15	1,634	165	15,067
April.....	151	12,994	20	2,031	171	15,025
May.....	150	12,826	23	2,675	173	15,501
June.....	150	12,637	26	2,755	176	15,392
July.....	150	12,547	30	3,814	180	16,361
August.....	153	12,565	31	4,022	184	16,587
September.....	141	11,838	29	4,189	170	16,027
October.....	146	11,281	29	4,131	175	15,412
November.....	137	11,016	30	3,466	167	14,482
December.....	138	12,094	28	2,964	166	15,058
Total.....		149,395		34,517		183,912
Average.....	147		24		171	

Power Employed in the Petroleum Industry in Canada during 1921, by Provinces

TABLE 305

Description	Ontario		Alberta		Total for Canada	
	Number of units	Total rated H.P.	Number of units	Total rated H.P.	Number of units	Total rated H.P.
Boilers—						
Fired by hand.....	4	130	3	100	7	230
Fired mechanically.....			6	340	6	340
Stationary engines—						
Steam.....	3	80	3	95	6	175
Gas.....	63	540	1	8	64	548
Oil.....	5	38			5	38
Electric motors—						
Alternating current.....	39	337			39	337
Direct current.....	15	173			15	173
		Total capacity K.V.A.				Total capacity K.V.A.
Generators or Dynamos—						
Direct current.....	5	55			5	55

Miscellaneous Expenses in the Petroleum Industry in Canada during 1921, by Provinces

TABLE 306

	Ontario	Alberta	Total for Canada
	\$	\$	\$
Cost of purchased power.....	18,013		18,013
Cost of all materials and supplies used.....	58,379	899	59,278
Royalties paid.....	7,463		7,463
Taxes—			
Municipal.....	6,011	114	6,125
Provincial.....	872	1,064	1,936
Federal.....	15,733		15,733
All other sundry expenses.....	27,146	583	27,729
Total miscellaneous expenses.....	133,617	2,660	136,277

Oil Wells in Canada, 1920 and 1921

TABLE 307

	New Brunswick	Ontario	Alberta	British Columbia	Total
Productive wells at beginning of year.....					
1920.....	6	3,139	5		3,150
1921.....	7	3,015	5		3,027
Number of wells drilled.....					
1920.....	1	56	6	4	67
1921.....	1	9			10
Number of wells abandoned.....					
1920.....	3	353	1	2	359
1921.....	1	113			114
Number of productive wells at end of year.....					
1920.....	7	3,015	5		3,027
1921.....	7	2,997	5		3,009

Summary Statistics relating to the Petroleum Industry in Canada, 1917-1921

TABLE 308

Year	Number of operators	Average number of employees	Salaries and wages paid	Total value of production
			\$	\$
1917.....	168	270	167,205	542,239
1918.....	153	264	195,141	885,143
1919.....	120	274	210,936	736,324
1920.....	122	202	182,787	822,235
1921.....	120	190	215,791	641,533

SALT

The production of salt in Canada is from the salt wells located in the counties of Essex, Huron, Lambton and Bruce in Ontario, and from the salt mine at Malagash, Cumberland county, Nova Scotia.

Twelve firms, operating thirteen salt works, reported activity during the year 1921. Two of these plants were engaged principally in the production of brine for use in the manufacture of caustic soda and soda ash in the chemical works of the producing companies.

Where possible, comparative data for the years 1920 and 1921 have been given in the following tabulation:—

Distribution of Ownership of Producing Companies in the Salt Industry in Canada, 1921

TABLE 309

Province	Number of plants	Distribution of Ownership					
		Par Value of Stocks and Bonds issued by Incorporated Companies and held by Residents of Countries Indicated					
		Security	Canada	Great Britain	United States	Other Countries	Total
			\$	\$	\$	\$	\$
Nova Scotia.....	1	{ Stocks.....	1,319,080	76,600	305,300	.....	1,700,980
Ontario.....	10	{ Bonds.....	.....	.....	.....	.....	*743,000
Saskatchewan.....	1	{ Stocks.....	150,000	.....	.....	.....	150,000
		{ Stocks.....	1,469,080	76,600	305,300	.....	1,850,980
Total.....	12	{ Bonds.....	.....	.....	.....	.....	*743,000

*Distribution by countries not known.

Capital Invested by Producing Companies in the Salt Industry in Canada in 1920 and 1921

TABLE 310

Assets	1920	1921
	\$	\$
Lands, buildings, machinery and tools.....	1,396,411	1,417,078
Materials on hand, stocks in process, finished products, fuel and supplies on hand.....	553,693	452,746
Cash, trading and operating accounts and bills receivable.....	271,502	397,884
Total.....	2,221,606	2,267,708

Number of Employees, Work done and Wages paid in the Salt Industry in Canada during 1921

TABLE 311

	Average number of employees		Days Work Done		Total wages paid
	Males	Females	Males	Females	
					\$
January.....	229	28	4,655	561	22,528
February.....	225	31	4,590	596	21,627
March.....	247	30	6,400	840	31,487
April.....	241	31	5,007	652	25,040
May.....	252	31	6,256	823	30,673
June.....	253	30	6,349	784	30,202
July.....	253	33	5,513	728	24,953
August.....	250	30	5,450	695	26,737
September.....	268	34	6,106	849	30,117
October.....	255	33	5,524	712	25,525
November.....	240	32	5,761	771	27,947
December.....	227	42	5,128	770	23,667
Total.....			66,739	8,781	320,503
Average.....	245	32	272 days per year	274 days per year	\$4.24 per day

Salaried Employees in the Salt Industry in Canada during 1920 and 1921

TABLE 312

	1920			1921		
	Number of Employees		Total Salaries	Number of Employees		Total Salaries
	Male	Female		Male	Female	
			\$			\$
Salaried officers of corporations.....	13		38,471	3		8,200
General superintendents and managers.....				15		38,528
Technical experts, engineers, chemists, accountants.....				9	1	17,960
Clerks, stenographers, salesmen and other salaried employees.....				18	7	26,641
Total.....	33	13	73,098	45	8	91,329

Average Number of Wage-earners in the Salt Industry by Months in 1920

TABLE 313

Month	Number		Month	Number	
	Male	Female		Male	Female
January.....	258	29	July.....	276	32
February.....	263	30	August.....	272	26
March.....	283	34	September.....	257	26
April.....	281	30	October.....	269	28
May.....	272	31	November.....	248	24
June.....	267	30	December.....	232	22

Total number of days in operation during 1920..... 1,791
 Total wages paid during 1920..... \$372,369

Number of Wage-earners in the Salt Industry in Canada, classified by sex and according to their weekly rates of pay, 1920 and 1921

TABLE 314

		16 Years of Age and over		Under 16 Years of Age		Total employees
		Male	Female	Male	Female	
Under \$5.....	1920			2		2
	1921					
\$5 but under \$10.....	1920	4	1	3		8
	1921			1		1
\$10 " \$15.....	1920	16	18	1	1	36
	1921	6	24			30
\$15 " \$20.....	1920	30				30
	1921	81	9			90
\$20 " \$25.....	1920	37				37
	1921	91				91
\$25 " \$30.....	1920	76				76
	1921	45				45
\$30 " \$35.....	1920					
	1921	29				29
\$35 " \$40.....	1920					
	1921	7				7
\$40 " \$45.....	1920					
	1921	8				8
\$50 and over.....	1920					
	1921	2				2
Total.....	1920	163	19	6	1	189
	1921	269	33	1		303

Fuel Consumed in the Salt Industry of Canada during 1920 and 1921

TABLE 315

Kind	Year	Unit of measure	Total	
			Quantity	Cost
				\$
Bituminous Coal—				
Slack.....	1920	Short tons	73,876	512,382
	1921	"	58,592	396,514
Lump.....	1920	"	1,760	18,022
	1921	"	2,343	21,351
Coke.....	1920	"	336	161
	1921	"		
Gasoline.....	1920	Imp. gal.		
	1921	"	1,450	696
Oil (fuel).....	1920	"		
	1921	"	2,400	600
Wood.....	1920	Cord	268	1,315
	1921	"	245	2,225
Other fuel (steam).....	1920			
	1921			105,627
Total.....	1920			531,880
	1921			527,013

Power Employed in the Salt Industry in Canada during 1920 and 1921

TABLE 316

Kind	Number of Units		Rated Horse Power	
	1920	1921	1920	1921
Boilers—				
Fired by hand.....	27	19	6,010	3,655
Fired mechanically.....		15		3,350
Engines—				
Steam.....	13	14	430	399
Steam turbines.....		1		25
Oil.....		1		20
Gasoline.....	3	4	27	19
Electric Motors—				
Alternating current.....	29	29	442	443
Direct current.....	3	2	15	51
Generators or Dynamos—				
Direct current.....		2		90 K.V.A.
Air compressors.....		4		Capacity cu. ft. per minute free air 930

Miscellaneous Expenses in the Salt Industry in Canada in 1920 and 1921

TABLE 317

	1920	1921
	\$	\$
Rent of offices, works and machinery.....	2,476	2,539
Cost of purchased power.....	70,326	8,711
Insurance (premium for the year, only).....	18,983	26,154
Taxes—		
Municipal.....	9,990	3,108
Provincial.....		5,735
Federal.....		28,351
Royalties, use of patents, etc.....		360
Advertising expenses.....	28,497	25,769
Travelling expenses.....	7,146	15,161
Repairs to buildings and machinery.....	80,851	89,742
All other sundry expenses.....	155,755	175,501
Total miscellaneous expenses.....	409,493	381,126

Summary Statistics relating to the Salt Industry in Canada, 1917-1921

TABLE 318

Year	Number of Operating Firms	Average Number of Employees	Total Salaries and Wages Paid	Total Value of Production
			\$	\$
1917.....	10	309	249,073	1,047,792
1918.....	9	302	286,781	1,285,039
1919.....	11	329	350,141	1,397,929
1920.....	12	345	472,031	1,544,724
1921.....	12	277	411,832	1,673,685

List of Producing Companies in the Salt Industry in Canada, 1921

Name	Address	Location
<i>Nova Scotia—</i>		
Chambers & MacKay.....	New Glasgow, N.S.....	Malagash, Cumberland County.
<i>Ontario—</i>		
Canadian Salt Co., Ltd.....	719 Sandwich St. W., Windsor, Ont.	Windsor, Essex County.
Exeter Salt Works Co., Ltd.....	Exeter, Ont.....	Exeter, Huron County.
The Elarton Salt Works Co., Ltd.	Warwick, Ont.....	Watford, Lambton County.
Western Canada Flour Mills Co., Ltd.	Toronto, Ont.....	Goderich, Huron County,
The Wingham Salt Works.....	Wingham, Ont.....	Wingham, Huron County.
The Western Salt Co., Ltd.....	43 Victoria St., Toronto, Ont....	Courtright, Lambton County.
Ontario People's Salt and Soda Co., Ltd.	Kincardine, Ont.....	Kincardine, Bruce County.
The Dominion Salt Co., Ltd...	412 N. Front St., Sarnia, Ont....	N. Front St., Sarnia, Lambton County.
Goderich Salt Co., Ltd	Goderich, Ont.....	Goderich, Huron County.
<i>Saskatchewan—</i>		
Senlac Salt Co., Ltd.....	Senlac, Sask.....	T.w. 39, Range 25.

MISCELLANEOUS NON-METALLIC MINERAL INDUSTRIES

Capital Employed in the Miscellaneous Non-metallic Mineral Group, in Canada, 1921

TABLE 319

Industry	Lands, Buildings, Plant Machinery and Tools	Cost of All Materials on Hand, Supplies, Finished Products and Ore on Dump	Cash, Trading and Operating Accounts and Bills Receivable	Total Capital Employed
	\$	\$	\$	\$
Fluorspar.....	138,399	6,791	18,067	163,257
Grindstones.....	216,390	15,000	55,603	286,993
Iron oxides.....	175,630	28,678	3,259	207,567
Magnesite.....	1,958,533	152,694	40,000	2,149,227
Quartz.....	607,779	63,424	272,015	943,238
Talc.....	428,053	27,596	31,394	487,073
Other non-metallics ¹	2,007,053	371,236	20,453	2,398,742
Total.....	5,529,837	665,419	440,791	6,636,097

¹ Includes actinolite, barytes, chromite, corundum, magnesium sulphate, manganese, mineral waters, pyrites, sodium sulphate and tripolite.

Salaried Employees in the Miscellaneous Non-metallic Mineral Group, in Canada, 1921

TABLE 320

Industry	Superintendents and Managers	Technical Employees	Clerks and Stenographers	Total
Fluorspar..... No.	3	1		4
Salaries \$	3,761	900		4,661
Grindstones..... No.	6		1	7
Salaries \$	9,798		742	10,540
Iron oxides..... No.	2		1	3
Salaries \$	4,800		900	5,700
Magnesite..... No.	5	2	3	10
Salaries \$	7,550	3,600	3,856	15,006
Quartz..... No.	4	1	3	8
Salaries \$	8,866	6,000	4,611	19,477
Talc..... No.	3		2	5
Salaries \$	16,900		2,825	19,725
Other non-metallics ¹ No.	12	3	7	22
Salaries \$	31,133	4,135	9,176	44,444
Total..... No.	35	7	17	59
Salaries \$	82,808	14,635	22,110	119,553

¹ Includes actinolite, barytes, chromite, corundum, magnesium sulphate, manganese, mineral waters, pyrites, sodium sulphate and tripolite.

Average Number of Employees, Days Work Done and Wages Paid by Months, in the Miscellaneous Non-metallic Mineral Group, in Canada, 1921

TABLE 321

Month	Fluor-spar	Grind-stones	Iron Oxides	Magne-site	Quartz	Talc	Other Non-Metallics ¹	Total
January—								
Average number of employees....	93	8*	25	124	67	6	360	683
Days work done.....	2,524	215	578	2,876	1,768	132	5,274	13,367
Wages paid.....\$	10,215	644	3,269	11,977	7,689	563	28,467	62,794
February—								
Average number of employees....	72	4	25	177	72	22	324	696
Days work done.....	2,034	101	596	4,075	1,844	475	4,041	13,166
Wages paid.....\$	6,927	316	3,269	13,319	8,428	2,181	25,612	60,052
March—								
Average number of employees....	65	7	21	63	79	30	354	619
Days work done.....	2,024	180	546	1,576	2,231	776	5,034	12,367
Wages paid.....\$	7,619	538	3,110	6,679	8,908	3,201	22,956	53,011
April—								
Average number of employees....	27	37	43	92	30	359	588	588
Days work done.....	503	853	996	1,596	750	5,076	9,774	9,774
Wages paid.....\$		1,571	3,872	5,120	6,978	3,356	24,242	45,139
May—								
Average number of employees....	76	38	27	68	36	360	605	605
Days work done.....	1,861	949	519	2,048	906	3,865	10,148	10,148
Wages paid.....\$		5,717	3,793	2,309	8,959	4,151	20,096	45,025
June—								
Average number of employees....	124	38	28	120	45	343	698	698
Days work done.....	3,119	883	842	3,181	1,098	4,272	13,395	13,395
Wages paid.....\$		9,491	3,426	3,753	13,548	4,827	19,780	54,825
July—								
Average number of employees....	106	29	64	162	48	343	752	752
Days work done.....	2,766	766	702	3,391	1,180	4,335	13,200	13,200
Wages paid.....\$		8,463	2,938	3,013	14,433	5,259	20,249	54,355
August—								
Average number of employees....	99	20	56	76	53	286	590	590
Days work done.....	2,605	549	959	2,036	1,344	3,228	10,721	10,721
Wages paid.....\$		8,066	2,072	3,755	8,561	5,875	16,874	45,203
September—								
Average number of employees....	79	24	43	85	39	237	507	507
Days work done.....	1,399	608	806	2,042	972	1,952	7,779	7,779
Wages paid.....\$		4,349	2,271	3,228	8,202	4,223	8,962	31,235
October—								
Average number of employees....	34	27	66	86	38	198	449	449
Days work done.....	857	706	1,771	1,605	980	1,589	7,508	7,508
Wages paid.....\$		2,707	2,718	6,518	6,980	4,189	7,146	30,258
November—								
Average number of employees....	30	32	77	76	33	189	437	437
Days work done.....	617	799	1,955	1,833	854	1,503	7,562	7,562
Wages paid.....\$		1,980	3,312	7,120	7,042	3,773	6,450	29,677
December—								
Average number of employees....	10	26	83	54	32	188	393	393
Days work done.....	268	692	1,896	1,541	787	1,166	6,350	6,350
Wages paid.....\$		803	2,973	6,859	5,044	3,380	5,138	24,197
Total—								
Average number of employees....	77	50	29	71	86	34	312	659
Days work done.....	6,582	14,491	8,525	19,034	25,116	10,254	41,335	125,337
Wages paid.....\$	24,761	44,645	36,993	73,650	104,772	44,978	205,972	535,771
Days work done per man.....	85	290	294	268	298	302	133	.....
Average daily wage.....\$	3.76	3.08	4.34	3.34	4.14	4.39	4.98	.....

¹Includes Actinolite, Barytes, Chromite, Corundum, Magnesium Sulphate, Manganese, Mineral Waters, Peat, Pyrite Sodium Sulphate and Tripolite.

Fuel Used in the Miscellaneous Non-metallic Mineral Group, in Canada, 1921

TABLE 322

		Industry			
		Fluorspar	Grindstones	Iron oxides	Magnesite
Coal—Anthracite—					
Short tons.....		511		85	
Value.....	\$	4,562		1,120	
Coal—Bituminous—					
Short tons.....			555	815	2,166
Value.....	\$		5,276	7,009	19,501
Gasoline—					
Imperial gallons.....			236	3,000	240
Value.....	\$		130	1,020	82
Fuel oil—					
Imperial gallons.....		43,220	763		
Value.....	\$	8,583	164		
Wood—					
Cords.....			150	1,655	733
Value.....	\$		667	8,415	2,453
Total Value.....	\$	13,145	6,237	17,564	22,036

		Industry			Total
		Quartz	Talc	*Other non-metallics	
Coal—Anthracite—					
Short tons.....				2,550	3,146
Value.....	\$			15,747	21,429
Coal—Bituminous—					
Short tons.....		1,661	167	926	6,296
Value.....	\$	13,745	1,565	14,014	61,110
Gasoline—					
Imperial gallons.....				320	3,796
Value.....	\$			160	1,392
Fuel oil—					
Imperial gallons.....				20,864	64,847
Value.....	\$			4,551	13,298
Wood—					
Cords.....		319		1,200	4,057
Value.....	\$	1,530		4,504	17,569
Total Value.....	\$	15,275	1,565	38,976	114,798

*Includes actinolite, barytes, chromite, corundum, magnesium sulphate, manganese, mineral waters, pyrites, sodium sulphate and tripolite.

Power Employed in the Miscellaneous Non-metallic Mineral Group, in Canada, 1921

TABLE 323

Industry		Boilers all fired by hand	Stationary Engines			Electric Motors		D.C. Generators		Locomotives		Air Compressors
			Steam	Oil	Gas	Alternating Current	Direct Current			Gasoline	Steam	
Fluorspar.....	No. of Units	4	3			2	3	1				1
	Rated H.P.	380	320			95	20	30				
Grindstones.....	No. of Units	9	9									2
	Rated H.P.	565	315	40								
Iron oxides.....	No. of Units	1										
	Rated H.P.	75				127				2		
Magnesite.....	No. of Units	1	5		3	27				28		
	Rated H.P.	15	75		18	1,230					2	4
Quartz.....	No. of Units	8	2	2		9		2				4
	Rated H.P.	950	300	56		185		155				
Talc.....	No. of Units	1				14						1
	Rated H.P.	80				590						
Other non-metallics ¹	No. of Units	12	24	3	1	20		5		1		4
	Rated H.P.	1,067	1,068	137	3	672		111		30		
Total for group.....	No. of Units	36	43	6	4	76	3	8		3	2	16
	Rated H.P.	3,132	2,078	233	21	2,899	20	296		58		

¹Includes actinolite, barytes, chromite, corundum, magnesium sulphate, manganese, pyrites, sodium sulphate, and tripolite.

Miscellaneous Expenses in the Miscellaneous Non-metallic Group in Canada, 1921

TABLE 324

	Industry							Total
	Fluorspar	Grindstones	Iron Oxides	Magnesite	Quartz ¹	Talc	Other Non-metallics ¹	
Cost of purchased power.....	\$ 36	\$	\$ 3,120	\$ 5,169	\$ 2,808	\$ 14,166	\$ 7,335	\$ 32,634
Cost of all materials and supplies used.....	12,000	6,552	16,991	55,964	75,155	17,585	69,486	253,733
Royalties paid.....				643	2,277	16,962	1,850	21,732
Taxes—Municipal.....		304		1,633	183	431	558	3,109
Provincial.....	54	108	370	2,056	666		21,193	5,442
Federal.....		556		550	2,682	5,017	40	8,845
All other sundry expenses.....	3,226	5,018	11,584	89,081	52,145	11,446	37,068	209,568
Total miscellaneous expenses.....	15,316	12,533	32,065	155,096	135,916	65,607	118,530	535,063

¹Includes actinolite, barytes, chromite, corundum, magnesite sulphate, manganese, pyrites, sodium sulphate, and tripolite.

Firms Reporting Shipments in the Miscellaneous Non-metallic Mineral Group in Canada, 1921

Name	Address	Location
Fluorspar—		
Ontario—		
Cross and Wellington.....	Madoc, Ont.....	Huntingdon Township.
Herrington and Herrington....	Madoc, Ont.....	Madoc Township.
British Columbia—		
Consolidated Mining & Smelting Co. of Canada, Ltd.....	Trail, B.C.....	Grand Forks Division.
Grindstones—		
Nova Scotia—		
Mic-Mac Grindstone Co., Ltd.....	Woodburn, N.S.....	Woodburn.
New Brunswick—		
The Read Stone Co., Ltd.....	Sackville, N.B.....	Stonehaven.
The Miramichi Quarry Co., Ltd.....	Quarryville, N.B.....	Quarryville.
Iron Oxides—		
Quebec—		
Argall, Thos. H.....	Three Rivers, Que.....	Point du Lac, St. Maurice Co.
Canada Paint Co., Ltd.....	572 William St., Montreal, Que.....	Red Mill, Champlain Co.
Champlain Oxide Co.....	Three Rivers, Que.....	Champlain, Champlain Co.
British Columbia—		
Davidson, J. G. and Thompson, J.H.....	1641 Woodland Drive, Vancouver, B.C.....	Alta Lake, Mons.
Magnesite—		
Quebec—		
International Magnesite Co., Ltd.....	1005 Bank of N.S. Bldg., Montreal, Que.....	Harrington Township.
North American Magnesite Products, Ltd.....	127 Board of Trade Bldg., Montreal, Que.....	Grenville Township.
Scottish Canadian Magnesite Co.....	Montreal, Que.....	Grenville Township.
British Columbia—		
Pacific Roofing Co., Limited.	c.o. Canadian Credit Men's Trust Association Ltd., Victoria, B.C.	Clinton Mining Division.
Quartz—		
Quebec—		
Gorman, J. B.....	Buckingham, P.Q.....	Buckingham Tp.
O'Brien & Fowler.....	c.o. M. J. O'Brien Ltd., Ottawa...	Derry Township.
Pedneaud, G.....	Glen Almond, P.Q.....	Buckingham Township.
Silico Limited.....	103 St. Francois-Xavier, Montreal.	Parish of St. Canut.

Name	Address	Location
<i>Quartz</i> —Concluded		
Ontario— Dominion Mines and Quarries, Ltd.	Canada Life Building, 46 King St., West, Toronto, Ont.	District of Algoma. (East Neebish Quarry).
International Nickel Co.	Room 801, Dominion Bank Bldg., Toronto.	Dill Township.
Mond Nickel Co., Ltd., The.	Coniston, Ont.	Neelon Township.
Orser-Kraft Feldspar, Ltd.	Perth, Ont.	Bathurst Township.
Wright & Co.	960 Queen St., Sault Ste. Marie, Ont.	Deroche Township.
British Columbia— Granby Consolidated M. S. & P. Co., Ltd.	Anyox, B.C.	Anyox.
<i>Talc</i> —		
Ontario— Asbestos Pulp Co., Limited.	Belleville, Ontario.	"Connolly Mine", Huntingdon Tp., Hastings Co.
Henderson Mines, Limited.	Madoc, Ontario.	"Henderson Mine", Huntingdon Tp., Hastings Co.
Gillespie Co., Limited, Geo. H. (Mill).	Madoc, Ontario.	Plant at Madoc.
British Columbia— Eagle Talc and Mining Co.	W. G. Dickinson, 527 Yates St., Victoria, B.C.	Victoria Mining Division

Firms included under other Non-Metallics in Canada in 1921.

<i>Actinolite</i> — The Actinolite Mining Co., Ltd.	Bloomfield, N.J.	Kaladar Township, Ont.
<i>Barytes</i> — Brandram-Henderson Ltd.	Montreal, P.Q.	Lake Ainslie, Inverness County, N.S.
H. C. Bellew.	Suite 14-6 St. Sacrament St., Montreal.	North Burgess Tp., Ont.
<i>Corundum</i> — Corundum Limited.	Craigmont, Ont.	Raglan Township, Ont.
<i>Graphite</i> — Black Donald Graphite Co., Ltd.	Calabogie, Ont.	Brougham Township, Ont.
Quebec Graphite Co., Ltd.	4 Fenchurch Ave., London, E.C.	Lochaber Township, Que.
<i>Magnesium Sulphate</i> — Salts & Chemicals, Ltd.	44 Edward St., Kitchener, Ont.	Maskakee Lake, Sask.
Basque Chemical Production Co., Ltd.	349 Railway St., Vancouver, B.C.	Basque, B.C. (near Ashcroft).
<i>Manganese</i> — Consolidated Manganese Co.	Portland, Maine, U.S.A.	New Ross, Lunenburg Co., N.S.
<i>Peat</i> —Peat Committee (Federal Ontario).	Mines Branch, Ottawa.	Alfred, Ont.
<i>Pyrites</i> — Quebec—Weedon Mg. Co., Ltd. Ontario—	Montreal, Que.	Weedon, Que.
Algoma Steel Corp., Ltd.	Sault Ste. Marie, Ont.	Algoma District, Ont.
Grasselli Chemical Co., Ltd.	Hamilton, Ont.	Blythefield Tp., Ont.
Nichols Chemical Co., Ltd.	Montreal, Que.	"Northpines Mine", Drayton Tp., Ont.
British Columbia— Consolidated Mining & Smelting Co. of Can., Ltd.	Trair, B.C.	"Sullivan Mine", Kimberley, B.C.
Granby Consolidated Mining, Smelting & Power Co., Ltd.	Anyox, B.C.	"Hidden Creek", near Anyox, B.C.
<i>Sodium Sulphate</i> — Salts & Chemicals, Ltd.	44 Edward St., Kitchener, Ont.	Maskakee Lake, Sask.
Sodium Sulphate Co. of Saskatchewan, Ltd.	1753 Rose St., Regina, Sask.	Near Hardy, Sask.
<i>Tripolite</i> — Oxford Tripoli Co., Ltd.	Oxford, N.S.	Silica Lake, N.S.

STRUCTURAL MATERIALS AND CLAY PRODUCTS INDUSTRIES

CEMENT

The manufacture of Portland cement in Canada was carried on during 1921, by six companies which operated thirteen plants situated in the provinces of Quebec, Ontario, Manitoba, Alberta and British Columbia. In addition to these, one company in Nova Scotia made puzzolan cement. The total daily capacity of the fourteen plants in operation was 41,942 barrels. There were also nine plants in Canada equipped for the manufacture of cement which were idle throughout the year.

Practically all the cement produced in Canada is Portland cement for which the essential elements are lime, silica and alumina. These substances are found in limestone and clay, the Trenton variety of limestone being largely used. The production of puzzolan cement, which is manufactured from blast furnace slag, was less than 0.1 per cent of the total value of Canadian production.

The cement industry is almost entirely owned by Canadian capital. Table 325 indicates the distribution of ownership of this industry in 1921. The total par value of all securities issued amounted to \$40,628,676, of which amount \$35,116,930 or 86.5 per cent was owned in Canada, \$4,297,246 or 10.6 per cent was owned in Great Britain while the balance was held in foreign countries.

Distribution of Ownership of the Cement Industry in Canada, 1921*

TABLE 325

Security	Par value of Stocks, Bonds and Other Securities Issued by Incorporated Companies Owned by Residents of the Following Countries				Total
	Canada	Great Britain	United States	Other Countries	
	\$	\$	\$	\$	\$
Stocks.....	27,108,850	2,762,300	809,100	405,400	31,085,650
Bonds.....	7,708,080	1,534,946			9,243,026
Other securities.....	300,000				300,000
Total.....	35,116,930	4,297,246	809,100	405,400	40,628,676

* Does not include shares of the Dominion Iron and Steel Co., Ltd.

The total capital invested as expressed by the value of lands, buildings and machinery, materials on hand, cash, trading accounts and bills receivable, amounted at the end of 1921 to \$49,160,180 as compared with a total of \$44,941,686 reported in 1920. Table 326 shows the details of the capital invested.

Capital Invested in the Cement Industry in Canada, 1921

TABLE 326

	\$
Land, buildings and fixtures.....	31,893,101
Machinery and tools.....	4,741,607
Materials on hand, stocks in process, finished products on hand, fuel and miscellaneous supplies on hand.....	10,027,533
Cash, trading and operating accounts and bills receivable.....	2,497,939
Total.....	49,160,180

During 1921 there were 2,751 persons employed in this industry, while during 1920, the average was 2,301. The classification of employees according to the grade of position occupied, together with the salaries and wages paid for 1920 and 1921, is shown below. It will be noted that there was a considerable decrease in the amount of wages paid during 1921, while the number of employees increased, indicating that lower wage scales prevailed, following the general tendency throughout 1921.

Employees, Salaries and Wages Paid in the Cement Industry in Canada, 1920 and 1921

TABLE 327

Classes of Employees	1920		1921	
	Number of Employees	Salaries and Wages	Number of Employees	Salaries and Wages
Officers, superintendents and managers.....	25	\$ 84,912	48	\$ 226,443
Clerks, stenographers and other salaried employees..	176	342,835	295	503,715
Wage-earners.....	2,100	3,329,894	2,408	2,713,726
Total.....	2,301	3,757,641	2,751	3,443,884

A further classification of the total number of wage-earners employed as on December 15, for the years 1920 and 1921, respectively, according to weekly rates of pay within specified groups is presented in the next table.

Number of Wage-earners in the Cement Industry in Canada, classified by age and according to their weekly rates of pay, as on December 15, 1920 and 1921.

TABLE 328

Weekly Wage Rate	1920			1921		
	16 years of age or over	Under 16 years	Total Employees	16 years and over	Under 16 years	Total Employees
Under \$10.....	3	2	5	28		28
\$10 but under \$15.....	27	6	33	33	3	36
\$15 " \$20.....	77		77	178		178
\$20 " \$25.....	737		737	732		732
\$25 " \$30.....	803		803	514		514
\$30 and over.....	918		918	670		670
Total.....	2,565	8	2,573	2,155	3	2,158

The fourteen cement plants in Canada operated for a total of 2,597 days during 1921. The total number of days' work performed by wage-earners was 653,242. The time in operation, work performed and wages paid are shown by months in the table on the following page.

Time in Operation, Work Performed and Wages Paid in the Cement Industry in Canada, 1921

TABLE 329

Month	Number of Days Plants were in Operation	Total Number of Days Work Performed by Wage-Earners		Total Wages Paid
		By males	By females	
				\$
January.....	210	62,649	772	273,895
February.....	164	53,444	644	223,710
March.....	231	58,669	524	249,288
April.....	253	63,711	670	275,962
May.....	290	68,295	1,046	299,797
June.....	312	63,763	1,132	280,608
July.....	299	53,490	993	231,188
August.....	233	43,476	1,079	192,711
September.....	228	50,028	1,149	208,405
October.....	158	46,382	985	181,006
November.....	116	43,442	1,109	163,530
December.....	103	34,798	992	133,626
Total.....	2,597	642,147	11,095	2,713,726

The quantity and cost of the various kinds of fuel used in cement manufacturing during 1921 are shown by origin in Table 330. Returns from the different provinces show that the plants in Nova Scotia, Alberta and British Columbia used domestic fuel entirely, the total fuel cost in these provinces being \$252,393. In Quebec, Ontario and Manitoba the cost of foreign fuel used was \$2,534,132, only \$2,295 being paid for domestic fuel in these provinces. The industry is largely dependent on foreign fuel as coal is used almost exclusively and the majority of plants are situated in provinces where no coal is found.

Fuel Used in the Cement Industry in Canada, 1921

TABLE 330

Kind	Unit of Measure	Quantity	Cost
			\$
Bituminous coal—			
Slack.....	Short ton	330,667	2,778,452
Run of mine.....	"	400	3,200
Lump.....	"	40	133
Gasoline.....	Imp. gal.	12,320	4,763
Wood.....	Cord	469	2,272
Total.....			2,788,820

During 1920 the total cost of fuel used was \$3,457,796. Of this amount \$119,549 was spent for domestic fuel and \$3,338,247 for foreign fuel.

The power equipment used in this industry for 1921 is shown in Table 331.

Power Employed in the Cement Industry in Canada, 1921

TABLE 331

Class	Number of Units	Total H.P. according to manufacturer's rating
Boilers.....	18	3,066
Engines:		
Steam.....	16	2,720
Steam turbines.....	1	520
Gasoline.....	8	135
Hydraulic water wheels.....	6	500
Electric motors:		
Alternating current.....	988	53,159
Direct current.....	158	7,216
Generators:		
Alternating current.....	1	500 K.W.
Direct current.....	1	30 K.W.
Air compressors.....	3	

The miscellaneous expenses connected with this industry are itemized in Table 332.

Miscellaneous Expenditures in the Cement Industry in Canada, 1921

TABLE 332

	\$
Rent of offices, works and machinery.....	7,540
Cost of purchased power.....	559,966
Insurance (premium for the year only).....	238,091
Taxes (municipal, provincial and federal).....	182,086
Royalties, use of patents, etc.....	48,050
Advertising expenses.....	88,135
Travelling expenses.....	17,210
Repairs to buildings and machinery.....	556,789
All other sundry expenses (not elsewhere specified).....	904,162
Total.....	2,602,029

A recapitulation of the more important statistics pertaining to the cement industry is given below for the years 1920 and 1921.

Summary Statistics of the Cement Industry in Canada, 1920 and 1921

TABLE 333

	1920	1921
Number of active plants.....	13	14
Capital employed.....	\$ 44,941,686	\$ 49,160,180
Salaried employees.....	201	343
Salaries paid.....	\$ 427,747	\$ 730,158
Average number of wage-earners.....	2,100	2,408
Wages paid.....	\$ 3,329,894	\$ 2,713,726
Fuel cost.....	\$ 3,457,796	\$ 2,788,820
Miscellaneous expenses.....	\$ 1,738,152	\$ 2,602,029
Value of products sold or used.....	\$ 14,798,070	\$ 14,195,143

List of Plants Operating in the Cement Industry in Canada in 1921*Nova Scotia—*

Dominion Iron and Steel Co., Sydney.

*Quebec—*Canada Cement Co., Ltd., Head Office—Phillips Square, Montreal, Que.
Plants—Montreal East; Hull.*Ontario—*Canada Cement Co., Ltd. Mill No. 4, Belleville; Mill No. 5, Belleville;
Port Colborne.

Hanover Portland Cement Co., Ltd., Hanover.

St. Mary's Cement Co., Ltd., St. Mary's.

Manitoba—

Canada Cement Co., Ltd., Tuxedo.

Commercial Cement Co., Ltd., Babcock.

Alberta—

Canada Cement Co., Ltd., Exshaw,

Marlboro Cement Co., Marlboro.

British Columbia—

British Columbia Cement Co., Ltd., Head Office—305 Belmont Bldg., Victoria, B.C. Plants—Bamberton; Tod Inlet.

CLAY PRODUCTS

The production of clay products in Canada for the past three years has been tabulated in considerable detail in another section of this report and the object of this description is a consideration of the statistics regarding the more important financial aspects and the general conditions of the industry.

The clay products industry was divided into five main groups as follows, brick and tile, clay sewer pipe, fire brick and fireclay, stoneware and pottery, and kaolin and other clays. The numbers and location by provinces of the different plants are shown in the subjoined table.

Operating Establishments in the Clay Products Industry in Canada by Provinces, 1921

TABLE 334

Province	Number of Establishments in Groups Indicated					
	Brick and Tile	Clay Sewer Pipe	Firebrick and Fireclay	Stoneware and Pottery	Kaolin and other Clays	Total for Province
Nova Scotia.....	7	1	2		1	11
New Brunswick.....	4			1		5
Quebec.....	18	1	1		1	21
Ontario.....	136	3	3	2		144
Manitoba.....	7					7
Saskatchewan.....	7					7
Alberta.....	13		1	1		15
British Columbia.....	10					10
Total.....	202	5	7	4	2	220

The total capital employed in the clay products industry in Canada in 1921 amounted to \$28,515,928 divided as follows: Lands, buildings and fixtures—\$18,820,389; machinery and tools—\$4,258,785; materials on hand, stocks in process, etc.—\$2,831,837; and cash, trading and operating accounts, bills receivable, etc.—\$1,604,917. The detail is shown by provinces in Table 336, following. In Table 335 other items of interest such as the character and distribution of

ownership and the par value of issued securities is shown by groups. The brick and tile industry was of outstanding importance in comparison with the others in the group.

Distribution of Ownership of the Clay Products Industry in Canada, 1921

TABLE 335

Industry	Distribution of Ownership			
	Par Value of Stocks and Bonds Issued by Incorporated Companies and Held by Residents of the Countries Indicated.			
	Canada	Great Britain	United States	Total
	\$	\$	\$	\$
Brick and tile.....	14,655,258	236,488	717,580	15,609,326
Clay sewer pipe.....	2,064,133	117,000	163,200	2,344,333
Firebrick and fireclay.....	1,027,400		325,000	1,352,400
Stoneware and pottery.....	100,000			100,000
Kaolin and other clay products.....	1,659,100		375,000	2,034,100
Total.....	19,505,891	353,488	1,580,780	21,440,159

Capital Employed in the Clay Products Industry in Canada, by Provinces, 1921

TABLE 336

	Land, Buildings and Fixtures	Machinery and Tools	Materials on Hand, Stocks in Process, Finished Products on Hand Fuel and Miscellaneous Supplies on Hand	Cash, Trading and Operating Accounts and Bills Receivable	Total
<i>Brick and tile—</i>	\$	\$	\$	\$	\$
Nova Scotia.....	687,072	370,678	33,176	81,296	1,172,222
New Brunswick.....	36,400	22,840	12,025	3,006	74,271
Quebec.....	5,808,025	307,013	386,377	183,918	6,685,333
Ontario.....	5,333,158	1,964,955	1,037,204	727,505	9,062,822
Manitoba.....	342,828	183,200	134,333	61,245	721,606
Saskatchewan.....	614,054	274,572	74,005	24,646	987,277
Alberta.....	906,615	277,087	214,889	53,974	1,452,565
British Columbia.....	541,212	182,343	120,266	138,198	982,019
Total for Canada.....	14,269,364	3,582,688	2,012,275	1,273,788	21,138,115
<i>Clay sewer pipe—</i>					
Total for Canada.....	2,099,896	424,534	530,738	121,868	3,177,036
<i>Firebrick and fireclay products—</i>					
Total for Canada.....	1,060,921	226,319	218,357	137,525	1,643,122
<i>Stoneware and pottery—</i>					
Total for Canada.....	113,746	25,244	67,587	68,688	275,265
<i>Kaolin and other clays—</i>					
Total for Canada.....	2,276,462	.....	2,880	3,048	2,282,390
<i>Total for clay and clay products—</i>					
Nova Scotia.....	1,113,633	451,684	133,924	89,288	1,788,529
New Brunswick.....	47,431	25,840	24,379	8,649	106,299
Quebec.....	8,595,137	475,566	520,717	226,080	9,817,500
Ontario.....	7,168,372	2,341,413	1,416,459	917,809	11,844,053
Manitoba.....	342,828	183,200	134,333	61,245	721,606
Saskatchewan.....	614,054	274,572	74,005	24,646	987,277
Alberta.....	1,397,722	324,167	407,754	139,002	2,268,645
British Columbia.....	541,212	182,343	120,266	138,198	982,019
Total for Canada.....	19,820,389	4,258,785	2,831,837	1,604,917	28,515,928

The most important information with respect to conditions of employment and amounts paid for helpers is shown in the following tables. The data are shown for the whole clay products industry in Canada.

Of the 288 people engaged as salaried officials, 262 were males and 26 were females; \$582,760 was paid to these officials during 1921 or an average yearly salary of about \$2,024.

With regard to the wage-earners, a much smaller proportion were female workers whose earnings generally ranged from \$10 to \$15 per week. The wages paid to men ranged from \$20 to \$25 per week, although lower and higher wages were also paid to smaller numbers of the workers. For the whole of Canada, the average daily wage for all workers was \$4.064 per day, there having been a total of 784,279 days' work performed for which \$3,187,493 was paid. Similar information may be had for each province by consulting the data in the subjoined table.

Average Yearly Salaries and Daily Wages Paid in the Clay Products Industry during 1921, by Provinces

TABLE 337

Province	Total No. of Salaried Employees	Total Salaries	Average Yearly Salary	Number of Days' Work Performed by all Wage-Earners (a)	Total Wages Paid (b)	Average Daily Wage*
		\$	\$		\$	\$
Nova Scotia.....	10	29,262	2,926	37,232	135,447	3.64
New Brunswick.....	3	3,500	1,166	12,874	37,461	2.91
Quebec.....	34	77,503	2,279	127,170	514,380	4.04
Ontario.....	154	310,877	2,018	439,025	1,762,577	4.02
Manitoba.....	21	44,242	2,107	23,620	108,049	4.57
Saskatchewan.....	12	15,915	1,326	15,463	77,829	5.03
Alberta.....	31	61,226	1,329	84,239	365,898	4.34
British Columbia.....	23	40,235	1,749	44,656	185,852	4.16
Total.....	288	582,760	2,024	784,279	3,187,493	4.06

* The quotient from (b) divided by (a).

Salaried Employees and Salaries Paid in the Clay Products Industry in Canada, 1921

TABLE 338

Occupation	Male	Female	Salaries
			\$
Salaried officers of Corporation.....	77	3	216,996
General superintendents or managers.....	90		208,259
Technical experts, engineers, chemists, accountants, etc.....	30	1	52,095
Clerks, stenographers, salesmen and other salaried employees.....	65	22	105,410
Total.....	262	26	582,760

Work Performed and Wages Paid in the Clay Products Industry in Canada, 1921, by Months

TABLE 339

Month	Total Number of Days Work Performed by Wage Earners		Total Wages
	Male	Female	
January.....	28,733	467	\$ 123,746
February.....	30,580	574	131,736
March.....	38,347	672	166,087
April.....	53,027	768	226,974
May.....	83,670	788	342,295
June.....	100,567	885	411,045
July.....	97,208	818	392,950
August.....	94,776	825	378,785
September.....	80,216	771	317,985
October.....	68,331	710	278,659
November.....	55,023	634	222,116
December.....	45,284	605	195,115
Total.....	775,762	8,517	3,187,493

Classification of Wage-earners in the Clay Products Industry in Canada, according to Sex, and Weekly Rates of Pay, 1921

TABLE 340

Weekly Wage	16 years of age and over		Under 16 years of age		Total Employees
	Male	Female	Male	Female	
Under \$5.....	42	.....	6	.....	48
\$5 but under \$10.....	87	7	23	.....	117
\$10 but under \$15.....	305	21	26	.....	352
\$15 but under \$20.....	1,024	8	1	.....	1,033
\$20 but under \$25.....	1,453	1	.....	.....	1,454
\$25 but under \$30.....	882	1	.....	.....	883
\$30 but under \$35.....	320	.....	.....	.....	320
\$35 but under \$40.....	81	.....	.....	.....	81
\$40 but under \$45.....	44	.....	.....	.....	44
\$45 but under \$50.....	13	.....	.....	.....	13
\$50 and over.....	3	.....	.....	.....	3
	4,254	38	56	.....	4,348

Quantity and Value of Fuel Used in the Clay Products Industry by kinds in Canada, 1921

TABLE 341

Kind	Unit of Measure	Quantity	Cost delivered
Bituminous coal, slack.....	Short ton	24,208	\$ 191,938
Bituminous coal, lump.....	"	98,711	944,797
Bituminous coal, run of mine.....	"	27,472	249,689
Anthracite coal, lump.....	"	1,042	10,852
Anthracite coal, dust or slack.....	"	898	4,514
Lignite coal, slack.....	"	4,085	13,444
Lignite coal, lump.....	"	5,738	11,404
Lignite coal, run of mine.....	"	753	1,506
Coke.....	"	620	7,680
Gasoline.....	Imp. Gal.	5,029	1,924
Oil (fuel).....	"	51,116	7,164
Wood.....	Cord	56,214	334,913
Gas.....	1,000 cu. ft.	810,303	30,122
Other fuel.....	.....	.....	2,285
Total.....	.....	.....	\$1,812,232

Power Employed in the Clay Products Industry in Canada, 1921

TABLE 342

Class	Number of units	Total H.P. according to manufacturer's rating
Boilers—		
Fired by hand.....	177	11,867
Fired mechanically.....	9	1,092
Engines—		
Steam.....	125	9,053
Gas.....	13	339
Oil.....	9	281
Gasoline.....	10	75
Hydraulic turbines or water wheels.....	1	90
Electric motors—		
Alternating current.....	342	12,245
Direct current.....	26	870
Other power.....	2	44
		Total capacity
Generators or Dynamos—		
Alternating current.....	2	345 K.W.
Direct current.....	7	411 K.W.

Miscellaneous Expenses in the Clay Products Industry in Canada, 1921

TABLE 343

Rent of offices, works and machinery.....	\$	138,985
Cost of purchased power.....	\$	150,031
Insurance premium (for the year only).....	\$	130,402
Taxes—Municipal.....	\$	85,961
Provincial.....	\$	24,297
Federal.....	\$	65,608
Royalties, use of patents, etc.....	\$	15,608
Advertising expenses.....	\$	27,631
Travelling expenses.....	\$	47,435
Repairs to buildings and machinery.....	\$	387,172
All other sundry expenses.....	\$	577,319
Total.....	\$	1,650,449

LIME BURNING IN CANADA, 1921

Of the 66 lime burning plants operated in Canada, 1 was located in Nova Scotia, 5 in New Brunswick, 17 in Quebec, 34 in Ontario, 4 in Manitoba, 3 in Alberta and 2 in British Columbia. These plants were controlled and operated by 58 separate owners. The total capital employed amounted to \$4,990,969. The total value of the securities issued by the joint stock companies carrying on lime burning as an independent enterprise was \$3,171,484. The issued common stocks was \$3,149,900; bonds amounted to \$3,601, and par value of the securities of other kinds totalled \$17,983. Of this total, \$1,924,434 or 60 per cent was owned by residents of Canada, \$1,203,450, or 38 per cent, by residents of the United States, and the balance \$43,600 in Great Britain. The detail is shown by provinces in the accompanying tables (344) and (345).

There have not been included in the foregoing record any data regarding the several large industries such as those producing cyanamide, refining sugar, etc., by which lime burning is carried on as a subsidiary industry contributing raw materials for further use in the same or related plants. In the commodity statistics, the total output from all plants was given.

Distribution of Ownership of Securities Issued by the Incorporated Companies in the Lime Industry in Canada, 1921

TABLE 344

Province	Distribution of Ownership.				
	Total Par Value of Securities Issued by Incorporated Companies and Held by Residents of the Countries Indicated.				
	Security	Canada	Great Britain	United States	Total
		\$	\$	\$	\$
New Brunswick.....	Stocks.....	168,300			168,300
Quebec.....	Stocks.....	416,550		134,450	551,000
Ontario.....	Stocks.....	671,600		8,500	680,100
	Bonds.....	3,601			3,601
	Other Securities	17,983			17,983
Manitoba.....	Stocks.....	570,300	10,700	42,000	623,000
Alberta.....	Stocks.....	74,600	32,900	20,000	127,500
British Columbia.....	Stocks.....	1,500		998,500	1,000,000
Canada.....	Stocks.....	1,902,850	43,600	1,203,450	3,149,900
	Bonds.....	3,601			3,601
	Other Securities	17,983			17,983
Total.....		1,924,434	43,600	1,203,450	3,171,484

Capital Employed in Lime Burning in Canada, 1921

TABLE 345

	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$
Lands, buildings and fixtures.....	120,063	744,857	1,046,956	435,003	230,469	1,042,023	3,619,371
Machinery and tools.....	50,802	199,147	185,809	11,728	5,633	300	453,419
Materials on hand, stocks in process, finished products on hand, fuel and miscellaneous supplies on hand.....	47,718	112,295	108,629	63,727	8,865	79,133	420,367
Cash, trading and operating accounts and bills receivable	10,155	152,008	241,321		23,605	70,723	497,812
Total.....	228,738	1,208,307	1,582,715	510,458	268,572	1,192,179	4,990,969

As might be expected, the number of salaried officials and the amount of salaries paid in this industry is small when compared to the value of the product made. This is due to the impossibility of making a complete separation of all those engaged, and many of them are necessarily included in other industries. There were in Canada some 87 salaried officials, 72 of whom were males and 15 females, who received salaries totalling \$131,152. On the other hand, those engaged in labour such as quarrying and working at the kilns received during the year a total of \$818,814 for 243,739 days' work or an average of about \$3.36 per day.

Salaried Employees and Salaries Paid in the Lime Industry in Canada, 1921

TABLE 346

Occupation	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Total for Canada
Salaried officers of corp.—							
Male.....	1	10	10				21
Female.....			2				2
Salary.....	\$1,000	\$4,740	\$22,286				\$28,026
General supts., managers—							
Male.....	2	6	12	2	2	4	28
Salary.....	\$3,400	\$19,800	\$23,045	\$3,900	\$5,000	\$13,500	\$68,645
Technical experts, engineers, chemists, accountants, etc.—							
Male.....	1	4	1	1			7
Salary.....	\$300	\$4,400	\$1,000	\$1,800			\$7,500
Clerks, stenographers, salesmen—							
Male.....	2	6	4	1		3	16
Female.....	1	4	4			4	13
Salary.....	\$1,045	\$7,889	\$5,978	\$1,200		\$10,869	\$26,981
Total—							
Male.....	6	26	27	4	2	7	72
Female.....	1	4	6			4	15
Salary.....	\$5,745	\$36,829	\$52,309	\$6,900	\$5,000	\$24,369	\$131,152

Labour Statistics of the Lime Industry in Canada, 1921, by Provinces

TABLE 347

Province	Average No. of men employed	Days work done	Wages	Average daily wage
			\$	\$
New Brunswick.....	102	26,820	91,096	3.40
Quebec.....	187	54,100	174,460	3.22
Ontario.....	366	100,862	341,826	3.39
Manitoba.....	48	13,445	57,198	4.25
Alberta.....	19	4,573	17,920	3.92
British Columbia.....	122	43,939	136,314	3.10
Total for Canada.....	844	243,739	818,814	3.36

A classification of wage-earners according to weekly earnings is given in Table 348. Of the 864 employees, 350 received from \$15 to \$20 per week and 293 from \$20 to \$25. Of the remaining 221 wage-earners, 91 received less and 130 more than these payments. None under 16 years of age were employed, nor were females reported as being on the payrolls.

Number of Wage-earners in the Lime Industry in Canada, as on December 15, 1921, classified according to their weekly rates of pay.*

TABLE 348

Weekly wage	Number	Weekly wage	Number
Under \$5.....	2	\$30 " \$35.....	26
\$5 but under \$10.....	7	\$35 " \$40.....	8
\$10 " \$15.....	82	\$40 " \$45.....	2
\$15 " \$20.....	350	\$45 " \$50.....	2
\$20 " \$25.....	293		
\$25 " \$30.....	92		
		Total.....	864

*All male employees.

The principal item among the fuels used was wood, of which 56,539 cords valued at \$307,303 was used. Bituminous coal came next with 23,629 tons consumed valued at \$241,152. Small amounts of gasoline, fuel oil and gas were also used. The data for these items are given in Table 349, and in Tables 350 and 351 following, other information concerning miscellaneous expenses and machinery installed is tabulated.

Fuel Used in the Lime Industry in Canada, 1921

TABLE 349

Kind	Unit of Measure	Quantity	Value
Bituminous coal, slack.....	Short ton	23,629	\$ 241,152
Bituminous coal, lump.....	"	3,947	52,506
Bituminous coal, run of mine.....	"	6,877	55,414
Anthracite coal, lump.....	"	10	150
Anthracite coal, dust or slack.....	"	1,763	9,044
Lignite coal, lump.....	"	20	222
Gasoline.....	Imp. gal.	5,859	2,261
Wood.....	Cord	56,989	310,003
Gas.....	M cu. ft.	285,440	28,240
Total cost.....			698,992

Miscellaneous Expenses in the Lime Industry in Canada, 1921

TABLE 350

	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Total of Canada
	\$	\$	\$	\$	\$	\$	\$
Rent of offices, works and machinery.....	56	4,230	4,641	2,381		204	11,512
Cost of purchased power.....	145	9,131	11,886	251		6,635	28,048
Insurance (premium for the year only).....	2,617	6,802	4,687	3,178	215		17,499
Taxes.....							
Municipal.....	232	4,457	4,902	1,802	156		11,549
Provincial.....		1,126	2,304		11	2,440	5,881
Federal.....	13	4,939	1,342		459	4,338	11,091
Royalties, use of patents, etc.....		419	1,769			125	2,313
Advertising expenses.....	75	220	1,459			570	2,324
Travelling expenses.....	125	1,021	3,665	9,209	1,562	3,447	19,029
Repairs to buildings and machinery..	2,863	40,575	35,109	3,730	2,707	7,877	92,861
All other sundry expenses.....	26,079	61,217	106,580	6,923	4,283	431	205,513
Total value.....	32,205	134,137	178,344	27,474	9,393	26,067	407,620

Power Employed in the Lime Industry in Canada, 1921

TABLE 351

Class	Number of units	Total H.P. according to manufacturer's rating
Boilers—		
Fired by hand.....	35	1,543
Engines—		
Steam.....	27	1,181
Gas.....	2	6
Gasoline.....	6	73
Hydraulic turbines or water wheels.....	3	20
Electric motors—		
Alternating current.....	49	1,005
Direct current.....	36	767
Generators or dynamos—		
Alternating current.....	2	Total capacity 155 K.W.
Air compressors.....	10	Capacity 7,653 cu. ft. per min. free air

SAND AND GRAVEL

For statistical purposes, the sand and gravel industry has been divided into two parts: comprising the operations of (1) railway companies producing sand and gravel for ballast and other purposes; (2) all other producers. About two-thirds of the total output, or 7,696,866 tons, was produced by the railway companies. Only a nominal value was placed upon this production by railway companies, amounting in all to only \$1,143,925 which was almost \$250,000 less than the value placed by dealers upon the remaining one-third of the total.

The figures given in the following tables do not include the operations of railway companies except where specifically mentioned. The railway companies were not asked to furnish any statistics for this industry other than the figures for production, as, owing to the varied nature of their operations, it would have been impossible for them to give the detailed data generally required. Among the other operators in this industry, of whom there were 218 in Canada in 1921, it was often found that the production of sand and gravel was quite a subsidiary part of the business transacted. For this reason, such items as the value of stock issued, and the actual capital employed have been omitted from the present compilation. The data given for this section have been confined to such more easily computed information as the number of employees engaged, amount of salaries and wages paid, power used, and miscellaneous expenses incurred.

In order to present more compact data, a grouping of provinces according to geographical location has been adopted. The statistics for the Maritime Provinces and Quebec have been combined, Ontario is presented separately, the Prairie Provinces are grouped together and British Columbia is shown separately. A total of these four groups forming the Dominion Total for the industry is also shown in each table.

A total of 65 salaried employees receiving salaries to the value of \$104,266 was reported in 1921. There were also 590 wage-earners employed to whom total wage payments of \$350,644 were made. These totals do not represent the actual number of persons engaged in the industry as a great many of the small operators had no paid help. Also, in some instances, the labour was provided by the parties requiring the sand and gravel.

Table 352 shows the reported number of days' work done and wages paid in this industry in 1921. The number of salaried employees and salaries paid is also shown.

Labour Statistics of the Sand and Gravel Industry in Canada, 1921, by Provinces

TABLE 352

Province	No. of salaried employees	Salaries paid	Average number of wage earners	Days' work done	Wages paid	Average daily wage
		\$			\$	\$
Nova Scotia.....	9	10,450	73	9,460	35,652	3.77
New Brunswick.....						
Quebec.....						
Ontario.....	36	65,473	307	55,887	228,628	4.09
Manitoba.....	11	14,575	174	8,789	41,855	4.76
Saskatchewan.....						
Alberta.....	9	13,768	36	10,512	44,509	4.23
British Columbia.....						
Total for Canada.....	65	104,266	590	84,648	350,644	4.14

The fuel used by the industry was mainly for power purposes in operating derricks, excavators or shovels, practically all of which were installed in Ontario. Tables 353 and 354 show the fuel used in this industry and the power employed.

Fuel Used in the Sand and Gravel Industry in Canada, 1921

TABLE 353

Kind		Nova Scotia New Brunswick, Quebec	Ontario	Manitoba, Saskatche- wan, Alberta	British Columbia	Total for Canada
Coal—						
Anthracite.....	Tons		1			1
	Value \$		16			16
Bituminous.....	Tons	81	4,404	154	337	4,496
	Value \$	756	35,621	1,890	3,539	41,806
Lignite.....	Tons			455		455
	Value \$			1,707		1,707
Coke.....	Tons		94			94
	Value \$		948			948
Gasoline.....	Imp. gals.	60	7,102	10		7,172
	Value \$	24	2,854	4		2,882
Fuel oil.....	Imp. gals.		1,220			1,220
	Value \$		244			244
Wood.....	Cords		3			3
	Value \$		38			38
Total value.....	\$	780	39,721	3,601	3,539	47,641

Power Employed in the Sand and Gravel Industry in Canada, 1921

TABLE 354

Class	Nova Scotia, New Brunswick, Quebec		Ontario		Manitoba, Saskatche- wan, Alberta		British Columbia		Total for Canada	
	No.	Rated H.P.	No.	Rated H.P.	No.	Rated H.P.	No.	Rated H.P.	No.	Rated H.P.
Boilers (all fired by hand).....	4	105	19	488	7	490	1	50	31	1,133
Stationary Engines—										
Steam.....	1	30	24	703	4	460	5	86	34	1,279
Steam turbines.....			2	10					2	10
Gas.....			5	18	1	1			6	19
Hydraulic turbines or water wheels.....							8	269	8	269
Electric motors—										
Alternating current.....			21	600	5	385	5	300	31	1,285
Direct current.....			6	238					6	238
Generators or dynamos.....					1	280 KW	2	10 KW	3	290 KW
Air compressors.....							1		1	

The miscellaneous expenses in connection with this industry during 1921 are shown in Table 354.

Miscellaneous Expenses in the Sand and Gravel Industry in Canada, 1921

TABLE 355

Kind	Nova Scotia New Brunswick, Quebec	Ontario	Manitoba, Saskatche- wan, Alberta	British Columbia	Total for Canada
	\$	\$	\$	\$	\$
Cost of purchased power.....		12,341		5,400	17,741
Cost of all materials and supplies used in the pit.....	2,314	68,102	19,359	19,169	108,944
Royalties paid.....	120	24,006	3,095		27,221
Taxes—					
Municipal.....	286	5,553	714		6,553
Provincial.....	89	1,146	66	662	1,963
Federal.....	513	3,455	845		4,813
All other sundry expenses.....	7,839	72,147	12,682	5,500	98,168
Total miscellaneous expenses....	11,161	186,750	36,761	30,731	265,403

STONE

In this report, statistics of the stone industry have been practically confined to quarrying operations and to the production of sawn or polished stone when these operations were carried on in conjunction with the quarrying. In addition to this production of stone by regular operators, there is no doubt a large stone production by individuals such as farmers and others for house or barn foundations, concrete work, etc., of which it would be impossible to obtain any satisfactory record. A large quantity of stone is also used in railway construction work and in road building. It was obviously impracticable to obtain details of these operations.

The distribution of ownership of the incorporated companies engaged in the production of stone is shown in Table 356. It will be seen that the issued stocks, bonds and other securities are held almost entirely in Canada.

Distribution of Ownership of Producing Companies in the Stone Quarrying Industry in Canada, 1921

TABLE 356

Province	Distribution of Ownership				
	Total Par Value of Securities Issued by Incorporated Companies and Held by Residents of the Countries Indicated.				
	Security	Canada	Great Britain	United States	Total
		\$	\$	\$	\$
Nova Scotia.....	Stocks.....	25,634		2,210	27,844
New Brunswick.....	Stocks.....	78,500		3,000	81,500
Quebec.....	Stocks.....	3,155,700	160,500		3,316,200
	Bonds.....	2,679,000			2,679,000
Ontario.....	Stocks.....	2,937,492		248,400	3,185,892
	Bonds.....	106,226		250,000	356,226
	Other securities.....	22,388			22,388
Manitoba.....	Stocks.....	15,634		2,210	17,844
Alberta.....	Stocks.....	65,000			65,000
British Columbia.....	Stocks.....	260,000			260,000
Total for Canada.....	Stocks.....	6,522,326	160,500	253,610	6,936,436
	Bonds.....	2,785,226		250,000	3,035,226
	Other securities.....	22,388			22,388

The actual capital invested in this industry as represented by such assets as land, buildings, machinery, materials and products on hand, cash, trading and operating accounts, etc., is shown in Table 357, divided according to the provinces in which the quarries are located.

Capital Actually Employed in the Stone Quarrying Industry in Canada, 1921

TABLE 357

Province	Capital represented by			Total capital employed
	Lands, Buildings, Plant machinery and Tools	Cost of all materials, supplies and finished products on hand	Cash, trading and operating accounts and bills receivable	
	\$	\$	\$	\$
Nova Scotia.....	1,180,113	137,648	57,752	1,375,513
New Brunswick.....	107,593	32,227	30,568	170,388
Quebec.....	3,652,611	183,981	281,998	4,118,590
Ontario.....	3,976,992	219,658	310,827	4,507,477
Manitoba.....	607,457	60,000		667,457
Alberta.....	5,000	50	600	5,650
British Columbia.....	270,782	6,490	15,688	292,960
Total for Canada.....	9,800,548	640,054	697,433	11,138,035

Tables 358 and 359 below indicate the payments made to salaried employees and wage-earners in the industry during 1921. The average daily wage has been computed and is shown by provinces.

Salaried Employees and Salaries Paid in the Stone Quarrying Industry in Canada, 1921

TABLE 358

Occupation	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	British Columbia	Total for Canada
General superintendents and managers—							
No. Male.....	7	5	29	27	3	2	73
No. Female.....				1			1
Salaries.....	\$ 9,718	\$ 5,700	\$ 66,155	\$ 64,917	\$ 7,250	\$ 4,440	\$ 158,180
Technical employees, engineers, chemists, accountants, etc.—							
No. Male.....			3	2	2	1	8
Salaries.....			\$ 3,585	\$ 5,550	\$ 1,500	\$ 607	\$ 11,242
Clerks, stenographers, etc.—							
No. Male.....	2		23	16	2		41
No. Female.....	1		2	8		1	12
Salaries.....	\$ 2,191		\$ 25,158	\$ 30,693	\$ 1,949	\$ 600	\$ 60,591
Total for Canada—							
No. Male.....	9	5	55	45	7	3	124
No. Female.....	1		2	9		1	13
Salaries.....	\$11,909	\$ 5,700	\$ 94,898	\$ 101,160	\$ 10,699	\$ 5,647	\$ 230,013

Labour Statistics of the Stone Quarrying Industry in Canada in 1921, by Provinces

TABLE 359

Province	Average No. of Men Employed	Days Work Done	Wages Paid	Average Daily Wage
Nova Scotia.....	109	17,067	\$ 57,340	\$ 3.36
New Brunswick.....	65	12,892	51,596	4.00
Quebec.....	925	206,527	821,460	3.98
Ontario.....	809	170,322	702,507	4.12
Manitoba.....	50	10,463	43,788	4.18
Alberta.....	11	2,009	10,365	5.16
British Columbia.....	109	21,122	100,203	4.74
Total for Canada.....	2,067	440,402	1,787,259	4.06

The fuel used in stone quarrying is of small importance, the total value of all fuel used during the year being only \$141,442.

Fuel Used in the Stone Quarrying Industry in Canada, 1921

TABLE 360

Province	Coal						All Other Fuel (Value)	Total Value
	Anthracite		Bituminous		Lignite			
	Tons	Value	Tons	Value	Tons	Value		
		\$		\$		\$	\$	\$
Nova Scotia.....			1,134	6,026				6,026
New Brunswick.....	22	231	197	2,424			600	3,255
Quebec.....	761	5,558	4,647	49,191			5,801	60,550
Ontario.....	838	7,176	6,697	56,398			4,733	68,307
Manitoba.....			60	783	35	371	750	1,904
British Columbia.....			150	1,400				1,400
Total for Canada.....	1,621	12,965	12,885	116,222	35	371	11,884	141,442

All expenses incurred during 1921 exclusive of salaries, wages and fuel costs amounted to \$2,369,130. The detail of these expenditures is shown by provinces in the following table.

Miscellaneous Expenses Incurred in Stone Quarrying Industry in Canada, 1921

TABLE 361

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Total for Canada
	\$	\$	\$	\$	\$	\$	\$	\$
Cost of purchased power.....	2,525	8,000	69,783	74,861	4,548		651	160,368
Cost of all materials or supplies used in the quarry.....	16,367		198,889	371,029	3,751	1,640	34,058	625,734
Royalties paid.....	553	471	27,081	3,349		150	2,323	33,927
Taxes—Municipal.....	1,138	268	7,240	8,085	2,023	11	32	18,797
Provincial.....	794	61	3,184	7,146	282	91	1,030	12,588
Federal.....	4,339		2,049	13,827			1,363	21,578
All other sundry expenses.....	13,102	4,321	124,770	1,344,006	2,749	1,113	6,077	1,496,138
Total miscellaneous expenses.....	38,818	13,121	432,996	1,822,303	13,353	3,005	45,534	2,369,130

Power Used in the Stone Quarrying Industry in Canada, 1921

TABLE 362

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	British Columbia	Total for Canada
Boilers (fired by hand)..... No.	14	4	29	30	7	3	87
Rated H.P.	774	175	1,367	1,544	100	117	4,077
Stationary engines:							
Steam..... No.	7	4	16	21	6		54
Rated H.P.	440	120	1,025	1,275	75		2,935
Steam turbines..... No.				1			1
Rated H.P.				30			30
Gas..... No.	2		3	9		1	15
Rated H.P.	23		40	234		25	322
Oil..... No.			1	1			2
Rated H.P.			5	24			29
Hydraulic turbines or water wheels..... No.	2					7	9
Rated H.P.	80					600	680
Electric motors—							
Alternating current..... No.	4		121	78	7		210
Rated H.P.	133		5,374	3,811	320		9,638
Direct current..... No.			28	37			66
Rated H.P.		75	507	1,887			2,460
Generators or dynamos—							
Alternating current..... No.			2	2			4
Cap. KVA.			60	325			385
Direct current..... No.			18			1	19
Cap. KW.			1,036			7	1,043
Air compressors..... No.	4	2	18	8	3	6	41
Steam shovels..... No.	2		3	13	1	1	20
Drills: (operated by)							
Steam..... No.	9		13	11	2		35
Compressed air..... No.	1	1	72	22	3	6	105
Electricity..... No.			6	23			29
Gas or oil..... No.			1	2			3
Derricks: (operated by)							
Steam..... No.	3	1	15	3	5		27
Compressed air..... No.			5	4			9
Electricity..... No.		1	11	2			14
Gas or oil..... No.			1				1

v. Doc,
an
S.

-D-28

CANADA
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT

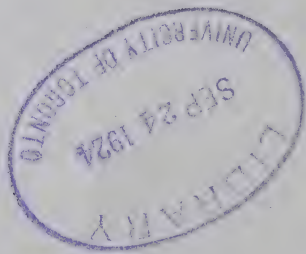
OF THE

MINERAL PRODUCTION OF
CANADA

DURING THE CALENDAR YEAR

1922

Published by Authority of the Hon. Thos. A. Low, M.P.,
Minister of Trade and Commerce



OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1924

Price, 50 cents.

List of Publications

PREPARED IN THE

MINING, METALLURGICAL AND CHEMICAL BRANCH, DOMINION BUREAU OF STATISTICS

(1) Mineral Production (Mining and Metallurgy)

General Reports:—

- (a) **Annual Report on the Mineral Production of Canada.**
- (b) **Preliminary Reports (semi-annual) on the Mineral Production of Canada.**

Coal:—

- (a) **Annual Report on Coal Statistics for Canada.**
- (b) **Monthly Report on Coal Statistics for Canada.**

In addition to the foregoing reports on mineral production a series of annual bulletins is issued, each of which contains statistics relative to a particular metal or non-metallic mineral or to a special section of the mineral industry; the series covers every phase of mineral production in Canada, and each bulletin is published as soon as final revised figures are available on the subject covered.

(2) Statistics of Manufactures based chiefly on Mineral Products.

Annual reports on each of the sections of manufactures covered by the Mining, Metallurgical and Chemical Branch are issued as follows:—

Annual:—

1. Iron and Steel and their Products—

Pig Iron and Ferro-Alloys—Steel and Rolled Products—Castings and Forgings—Boilers and Engines—Agricultural Implements—Industrial Machinery—Office and Household Machinery—Automobiles—Automobile Parts and Accessories—Bicycles—Railway Rolling Stock—Heating and Ventilating Equipment—Wire and Wire Goods—Sheet Metal Products—Hardware and Tools—Miscellaneous Iron and Steel Products.

2. Manufactures of Non-Ferrous Metals—

Aluminium and its Products—Brass and Copper Products,—Lead, Tin and Zinc Products—Precious Metal Products—Electrical Apparatus and Supplies—Miscellaneous Non-Ferrous Metal Products.

3. Manufactures of Non-Metallic Minerals—

Aerated Waters—Asbestos and Allied Products—Cement Products and Sand—Lime Brick—Coke and By-Products—Gas, Illuminating and Fuel—Glass (blown, cut, ornamental, etc.)—Monumental and Ornamental Stone—Petroleum Products—Miscellaneous Manufactured Non-Metallic Mineral Products including (a) Artificial Abrasives; (b) Abrasive Products; (c) Electrodes; (d) Fuel Briquettes; (e) Gypsum Products; (f) Mica Trimming.

4. Chemicals and Allied Products—

Coal Tar and Its Products—Acids, Alkalies, Salts and Compressed Gases—Explosives, Ammunition, Fireworks and Matches—Fertilizers—Medicinal and Pharmaceutical Preparations—Paints, Pigments and Varnishes—Soaps, Washing Compounds and Toilet Preparations—Inks, Dyes and Colours—Wood Distillates and Extracts—Miscellaneous Chemical Industries.

Monthly:—

1. Production of Iron and Steel in Canada.

In addition to the foregoing printed summary reports, a series of bulletins is being prepared, each number of which contains detailed statistics of a particular industry.

(3) Special Report.

Report on the Consumption of Prepared Non-Metallic Minerals in Canada.

CANADA
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT
OF THE
MINERAL PRODUCTION OF
CANADA
DURING THE CALENDAR YEAR
1922

Published by Authority of the Hon. Thos. A. Low, M.P.,
Minister of Trade and Commerce



OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1924

PREFACE

The present Annual Report on the Mineral Production of Canada is designed to supplement the Preliminary Reports on this subject issued by the Dominion Bureau of Statistics as for the six months ending June 30, 1922, and for the twelve months ending December, and to present the final figures for the whole of the calendar year.

Annual statistical reports on the mineral production of Canada have been published for many years, first by the Geological Survey, later by the Mines Branch of the Department of Mines, and, since 1921, by the Dominion Bureau of Statistics. The present report is issued in continuance of the series and while every effort has been made to ensure complete continuity of the record, certain new material has been introduced which it is believed will be found of value to the mineral industry.

The statistics relating to the different minerals and the general statistical tables have been prepared as formerly, and these have been supplemented by general reviews of the principal mineral industries, (e.g., the copper-gold industry, the silver-lead-zinc industry, the nickel copper industry, etc.), and a section on metallurgical works. In recent years the value of statistics of this character, covering capital, labour, equipment, etc., has become more generally recognized and the demand for such information has greatly increased.

A review of the metallurgical practice followed in a number of typical mills in Canada has been prepared by Mr. D. S. Halford, B.A. Sc., and has been included in this report for the information of the reader who may desire to obtain in concise form a general review of Canadian practice in the treatment of metalliferous ores.

To meet a demand for the names and addresses of concerns operating in the mineral industry, a list has been prepared and is included in this report; this departure from previous practice has much to commend it, and it is hoped that it will be found of value as a general reference.

The cordial thanks of the Bureau are tendered to the Dominion Department of Mines and to the several Provincial Department of Mines, which have without exception assisted materially in the preparation of the report. In reference to the co-ordination of the general work on mining statistics between the Provincial Departments and the Bureau, it has been found possible to arrange for the co-operative collection of monthly statistics of coal production with all the provinces in which such records are obtained, namely, Nova Scotia, New Brunswick, Saskatchewan, and Alberta. In the field of general mining statistics, co-operative arrangements with Ontario Department of Mines have been continued, thus preventing overlapping and duplication of work. The data collected by the Bureau on mining statistics are made available to the Dominion Department of Mines.

The thanks of the Bureau are also tendered to the mine and smelter operators, for assistance given and information made available. The railway and other transportation companies, as well as smelter operators outside of Canada, have also furnished data the receipt of which is gratefully acknowledged.

The report has been prepared under the direction of Mr. S. J. Cook, B.A., A.I.C., F.C.I.C., Chief of the Mining, Metallurgical and Chemical Branch of the Bureau, by Mr. A. C. Young B.Sc., who also directly supervised the work on metals and metalliferous ores. Mr. B. R. Hayden compiled the data on non-metalliferous products.

R. H. COATS,
Dominion Statistician.

DOMINION BUREAU OF STATISTICS, OTTAWA.
December 31, 1923.

TABLE OF CONTENTS

List of Publications.....	Inside front cover	PAGE
Preface.....	3	

Part One—Production Statistics

Mineral Production of Canada.....	7
General Statistical Review.....	9

METALLICS—

Aluminium.....	23
Antimony.....	24
Cobalt.....	25
Copper.....	28
Gold.....	34
Iron Ore.....	45
Pig-Iron.....	45
Lead.....	46
Mercury.....	51
Molybdenum.....	51
Nickel.....	52
Platinum and Palladium.....	55
Silver.....	58
Tin.....	65
Zinc.....	65

NON-METALLICS—

Abrasives.....	69
Actinolite.....	71
Arsenic.....	71
Asbestos.....	73
Barytes.....	75
Chromite.....	76
Coal.....	77
Coke.....	89
Feldspar.....	89
Fluorspar.....	91
Graphite.....	92
Gypsum.....	93
Iron Oxides.....	94
Magnesite.....	95
Magnesium Sulphate.....	96
Manganese.....	96
Mica.....	97
Mineral Water.....	98
Natro-Alunite.....	99
Natural Gas.....	99
Peat.....	100
Petroleum.....	100
Phosphate.....	103
Pyrites.....	104
Quartz.....	105
Salt.....	106
Sodium Carbonate.....	107
Sodium Sulphate.....	107
Talc.....	107

STRUCTURAL MATERIALS AND CLAY PRODUCTS—

Cement.....	110
Clay and Clay Products.....	112
Lime.....	121
Sand and Gravel.....	123
Sand-Lime Brick.....	125
Slate.....	126
Stone.....	126

Part Two—General Statistics

Introductory Review and General Tables.....	132
United States Tariff Rates on Mineral Products.....	138
Review of Metallurgical Practice in Canada.....	140

METALLIC MINERAL INDUSTRIES—

Alluvial Gold.....	153
Auriferous Quartz.....	155
Copper-Gold-Silver.....	159
Nickel-Copper.....	161
Silver-Cobalt.....	163
Silver-Lead-Zinc.....	166
Metallurgical Works.....	171

NON-METALLIC MINERAL INDUSTRIES—

Asbestos.....	175
Coal.....	177
Feldspar.....	180
Gypsum.....	182
Mica.....	184
Natural Gas.....	185
Petroleum.....	190
Salt.....	193
Miscellaneous Non-Metallic Mineral Industries including Fluorspar, Grindstones, Iron Oxides, Magnesite, Quartz, Talc, etc.....	195

STRUCTURAL MATERIALS AND CLAY PRODUCTS INDUSTRIES—

Cement.....	196
Clay Products.....	198
Lime Burning.....	200
Sand and Gravel.....	202
Stone Quarrying.....	204

Part Three—Directory

List of all concerns in the Canadian Mining Industry, operating in 1922.

METALLIC MINERAL INDUSTRIES—

Auriferous Quartz.....	208
Copper-Gold-Silver.....	209
Silver-Cobalt.....	210
Silver-Lead-Zinc.....	210

NON-METALLIC MINERAL INDUSTRIES—

Actinolite.....	212
Asbestos.....	212
Barytes.....	212
Coal.....	212
Feldspar.....	214
Fluorspar.....	215
Graphite.....	215
Grindstones.....	215
Gypsum.....	215
Iron Oxides.....	215
Magnesite.....	215
Magnesium Sulphate.....	215
Manganese.....	216
Mica.....	216
Natro-Alunite.....	216
Natural Gas.....	216
Peat.....	218
Petroleum.....	218
Pyrites.....	220
Quartz.....	220
Salt.....	220
Sodium Carbonate.....	221
Sodium Sulphate.....	221
Talc.....	221
Tripolite.....	221

STRUCTURAL MATERIALS AND CLAY PRODUCTS INDUSTRIES—

Cement.....	221
Clay Products (Brick and Tile, Clay Sewer-pipe, Firebrick and Fireclay, Kaolin, Stoneware and Pottery, etc.)..	222
Lime.....	225
Stone Quarrying.....	226

Table 1.—Quantities and Values of Mineral Products from Canadian Sources, 1921 and 1922

			1921			1922		
			Quantity	Value	Per cent of total	Quantity	Value	Per cent of total
METALLIC				\$			\$	
Cobalt, metallic and contained in oxide	Lb.		251,986	755,958	0.44	569,960	1,852,370	1.00
Copper (b).....	"		47,620,820	5,953,555	3.46	42,879,818	5,738,177	3.11
Gold.....	Fine oz.		926,329	19,148,920	11.14	1,263,364	26,116,050	14.17
Iron pig from Canadian ore.....	Tons		56,564	1,873,682	1.09	8,095	178,980	0.09
Iron ore sold for export.....	"		1,058	3,272		1,781	4,938	
Lead (c).....	Lb.		66,679,592	3,828,742	2.23	93,307,171	5,817,702	3.15
Nickel (d).....	"		19,293,060	6,752,571	3.92	17,597,123	6,158,993	3.34
Palladium.....	Crude oz.		591	38,267		724	47,060	0.02
Platinum (e).....	"		292	21,910		469	45,783	0.02
Rhodium, Osmium, Iridium.....	"		57	9,690		392	31,360	0.01
Silver (f).....	Fine oz.		13,543,198	8,485,355	4.94	18,646,439	12,576,758	6.82
Zinc.....	Lb.		53,089,356	2,471,310	1.44	56,290,000	3,217,536	1.74
Total.....				49,343,232	28.70		61,785,707	33.50
NON-METALLIC								
Actinolite.....	Tons		78	975		50	575	
Arsenic.....	"		1,491	233,763	0.14	2,576	321,037	0.17
Asbestos.....	"		92,761	4,906,230	2.85	163,706	5,552,723	3.01
Barytes.....	"		270	9,567		289	9,537	
Chromite.....	"		2,798	55,696		767	11,503	0.06
Coal.....	"		15,057,498	72,451,656	42.14	15,157,431	65,518,497	35.55
Corundum.....	"		403	55,965				
Feldspar.....	"		29,868	230,754	0.13	27,727	248,402	0.13
Fluorspar.....	"		5,519	136,267	0.08	4,503	102,138	0.05
Graphite.....	"		937	65,862		597	31,353	0.01
Grindstones.....	"		1,281	64,067		1,005	43,742	0.02
Gypsum.....	"		386,550	1,785,538	1.04	559,265	2,160,898	1.17
Magnesite.....	"		3,730	81,320		2,849	76,294	0.04
Magnesium sulphate.....	"		2,029	39,506		1,021	24,017	0.01
Manganese.....	"		68	3,400		73	2,044	
Mica.....	"		702	70,063		3,349	152,263	0.08
Mineral water.....	Gal.		328,273	21,716		221,433	14,220	
Natural gas.....	Tons		30	1,500		50	2,500	
Natural gas (g).....	M cu. ft.		14,077,601	4,594,164	2.67	14,682,651	5,846,501	3.17
Oxides, iron.....	Tons		9,048	93,610		7,285	110,608	0.06
Peat.....	"		1,666	6,064		14,500		
Petroleum, crude.....	Bbl.		187,540	641,533	0.37	179,068	611,176	0.33
Phosphate.....	Tons		30	450		190	1,796	
Pyrites.....	"		32,173	116,326		18,143	74,303	
Quartz.....	"		100,350	312,947	0.18	109,947	208,598	0.11
Salt.....	"		164,658	1,673,685	0.97	181,794	1,628,323	0.88
Sodium carbonate.....	"		197	14,775		202	3,027	
Sodium sulphate.....	"		623	18,850		504	11,980	
Talc.....	"		10,124	144,565	0.08	13,195	188,458	0.10
Tripolite.....	"		341	11,268		219	5,781	
Total.....				87,842,682	51.09		82,976,794	45.00
STRUCTURAL MATERIALS AND CLAY PRODUCTS								
Cement, portland and puzzolan.....	Bbl.		5,752,885	14,195,143	8.26	6,943,972	15,438,481	8.38
Clay products—								
Brick, common.....	No.		220,438,243	3,567,503	2.08	294,919,113	4,714,658	2.56
Brick, pressed.....	"		80,947,398	1,738,293	1.01	90,577,826	1,839,549	0.99
Brick, moulded and ornamental.....	"		1,995,284	50,576		41,851,765	865,664	0.47
Brick, paving.....	"					150,813	5,972	
Firebrick.....	"		4,502,233	242,462	0.14	6,705,127	251,776	0.14
Fireclay.....	Tons		2,931	29,851		10,196	55,185	0.02
Fireclay blacks and shapes.....	"			91,685			67,588	0.04
Fireproofing.....	"			452,296	0.26		542,611	0.29
Hollow building brick or blocks.....	No.		3,627,777	177,273	0.10	4,892,504	448,674	0.24
Kaolin.....	Tons		124	1,888		1,197	17,866	
Pottery.....	"			231,262	0.13		266,391	0.14
Sewer-pipe.....	Tons			1,666,584	0.97	75,932	1,766,347	0.96
Terra-cotta.....	"			134,193	0.08		188,789	0.10
Tile, drain.....	No.			473,952	0.28	14,730,963	407,386	0.22
Lime.....	Bush.		6,879,067	2,781,147	1.62	8,972,971	3,165,005	1.72
Sand and gravel.....	Tons		11,574,862	2,537,249	1.48	11,666,374	3,502,935	1.90
Slate.....	"			22,325		1,899	14,871	
Stone—								
Granite.....	Tons		319,398	937,894	0.55	457,925	1,486,250	0.81
Limestone.....	"		3,322,024	5,155,046	3.00	3,152,124	4,175,941	2.27
Marble.....	"		1,650	172,720	0.10	1,912	231,894	0.13
Sandstone.....	"		28,426	78,036		25,221	80,908	0.04
Total.....				34,737,425	20.21		39,534,741	21.50
Grand total.....				171,923,342	100.00		184,297,242	100.00

Table 2.—Increase or Decrease in Quantities and Values of Mineral Products from Canadian Sources, in 1922 as compared with 1921

		Increase (+) or Decrease (—)		Increase (+) or Decrease (—)		
		Quantity	%	Value	%	
				\$		
METALLIC						
Cobalt, metallic and contained in oxide.....	Lb.	+	317,974	+	126.1	
Copper.....	"	+	4,741,002	+	10.0	
Gold.....	Fine oz.	+	337,035	+	36.3	
Iron pig from Canadian ore.....	Tons	+	48,469	+	85.7	
Iron ore sold for export.....	"	+	723	+	68.3	
Lead.....	Lb.	+	26,627,579	+	39.9	
Nickel.....	"	+	1,695,937	+	8.8	
Palladium.....	Crude oz.	+	133	+	22.5	
Platinum.....	"	+	177	+	60.6	
Rhodium.....	"	+	335	+	587.7	
Silver.....	Fine oz.	+	5,038,241	+	37.1	
Zinc.....	Lb.	+	3,200,644	+	6.0	
Total.....				+	12,442,475	
				+	25.2	
NON-METALLIC						
Actinolite.....	Tons	—	28	—	35.9	
Arsenic.....	"	+	1,085	+	72.7	
Asbestos.....	"	+	70,945	+	76.4	
Barytes.....	"	+	19	+	07.0	
Chromite.....	"	+	2,031	+	72.6	
Coal.....	"	+	99,933	+	0.6	
Corundum.....	"	—	403	—	55.965	
Feldspar.....	"	—	2,141	—	7.2	
Fluorspar.....	"	—	1,016	—	18.5	
Graphite.....	"	—	340	—	36.3	
Grindstones.....	"	—	276	—	21.6	
Gypsum.....	"	+	172,715	+	44.6	
Magnesite.....	"	—	881	—	23.7	
Magnesium sulphate.....	"	—	1,008	—	49.7	
Manganese.....	"	+	5	+	7.3	
Mica.....	"	+	2,647	+	377.0	
Mineral water.....	Gal.	—	106,840	—	32.6	
Natro-alunite.....	Tons	+	20	+	66.6	
Natural gas.....	M cu. ft.	+	605,050	+	4.2	
Oxides, iron.....	Tons	—	1,763	—	19.5	
Peat.....	"	+	1,334	+	80.0	
Petroleum, crude.....	Bbl.	—	8,472	—	4.6	
Phosphate.....	Tons	+	160	+	553.3	
Pyrites.....	"	+	14,030	+	43.7	
Quartz.....	"	+	9,597	+	9.5	
Salt.....	"	+	17,136	+	10.4	
Sodium carbonate.....	"	+	5	+	2.5	
Sodium sulphate.....	"	—	119	—	19.2	
Talc.....	"	+	3,071	+	30.3	
Tripolite.....	"	—	122	—	35.8	
Total.....				—	4,865,888	
				—	5.6	
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement, portland and puzzolan.....	Bbl.	+	1,191,087	+	20.7	
Clay products—						
Brick, common.....	No.	+	74,480,870	+	33.7	
Brick, pressed.....	"	+	9,630,428	+	11.8	
Brick, moulded and ornamental.....	"	+	2,202,894	+	48.9	
Firebrick.....	"	+	7,265	+	248.7	
Fireclay.....	Tons	+	25,334	+	84.8	
Fireclay blocks and shapes.....	"	—	24,097	—	26.3	
Fireproofing.....	"	+	90,315	+	19.9	
Hollow building brick or blocks.....	No.	+	1,264,727	+	34.8	
Kaolin.....	Tons	+	1,073	+	865.3	
Pottery.....	"	+	15,978	+	846.3	
Sewer pipe.....	"	+	35,129	+	15.2	
Terra-cotta and tile other than drain.....	"	+	99,763	+	5.9	
Tile, drain.....	"	+	54,596	+	40.6	
Lime.....	Bush.	+	66,566	+	14.1	
Sand and gravel.....	Tons	+	2,093,904	+	30.4	
Slate.....	"	+	91,512	+	0.7	
Stone—						
Granite.....	Tons	+	7,454	+	33.4	
Limestone.....	"	+	138,527	+	43.3	
Marble.....	"	—	169,900	—	5.2	
Sandstone.....	"	+	262	+	15.8	
	"	—	3,205	—	11.3	
Total.....				+	4,797,313	
Grand total.....				+	12,373,900	
					+	17.1

DOMINION BUREAU OF STATISTICS, CANADA

R. H. COATS, B.A., F.S.S., F.R.S.C., Dominion Statistician

S. J. COOK, B.A., A.I.C., F.C.I.C., Chief of the Mining, Metallurgical and Chemical Branch

REPORT OF THE MINERAL PRODUCTION OF CANADA DURING THE CALENDAR YEAR, 1922

General Review.—A marked recovery in metal mining in Canada was the principal contributing factor in raising the value of the year's output for the mining industry to a total of \$184,297,242, an advance of 7.1 per cent over the production recorded in the previous year. The smelter output of metallic minerals, computed at average prevailing prices for the year, reached a total of \$61,785,707 as compared with \$49,343,232 in 1921; metallic minerals contributed 33.5 per cent of the total value of all mineral products for the year. Non-metallic minerals, including coal, contributed \$82,976,794 to the year's production, a decline of 5.6 per cent from the value of \$87,842,682 credited to this group in the previous year. In point of value, non-metallics constituted 45 per cent of the total production. Structural materials and clay products, valued at \$39,534,741, showed an increase of 13.8 per cent over the \$34,737,428 which represented the value of the output in 1921. The value of this group of products formed 21.5 per cent of the total output of the mining industry.

For statistical and comparative purposes it has always been customary to determine the value of the metals, copper, gold, lead, nickel, silver and zinc as far as possible on the basis of the quantities of metals recovered from Canadian ores smelted during the year, either in Canada or abroad and to compute the value of this production in each case at the average price of the refined metal in a recognized market. The value of the non-metallics, and of the structural materials is determined as the value received by the producer at point of shipment. In this report, no departure has been made from the practice previously followed. The New York market was used in the case of the principal metals since most sales of Canadian products are made on that market.

In comparison with preceding years the mineral production of Canada in 1922 was very creditable and was only exceeded in value by the records established in 1918 of \$211,301,000 and in 1920 when the peak of \$227,859,000 was reached.

The principal mineral-producing province of Canada in 1922 was Ontario, the value of its mineral production being determined as \$65,866,029. British Columbia came second with a mineral production valued at \$39,423,962; Alberta was third with \$27,872,136; Nova Scotia ranked fourth with \$25,923,499. The other provinces followed in the order named: New Brunswick, \$2,263,692; Manitoba, \$2,258,942; Yukon Territory, \$1,785,573; and Saskatchewan, \$1,255,470.

Seventeen products contributed 98.59 per cent of the total recorded value of the mineral production of Canada in 1922 and in order of the values assigned these were: coal, gold, cement, silver, clay products, nickel, stone, natural gas, lead, copper, asbestos, sand and gravel, zinc, lime, gypsum, cobalt and salt. Production values of these commodities ranged from \$65,518,497 for coal to \$1,628,323 for salt.

The outstanding feature of the metal production was the excellent gain made in the output of gold by the two important producing provinces, Ontario and British Columbia. The total gold production for Canada during the year amounted to 1,263,364 fine ounces, and, compared with the 1921 output, showed an increase of 36.3 per cent.

Increased prices and better markets for silver and lead were reflected in excellent gains. Silver advanced 37.1 per cent in quantity and 48.2 per cent in value while lead production rose 39.9 per cent and the value increased 51.9 per cent over the record for the previous year.

Nickel and copper were lower than in 1921, although the advance in the price of copper checked the decline in value to 3.78 per cent as compared with a 10 per cent decrease in quantity. Nickel fell off 8.8 per cent in both quantity and value. The smelter production of blister and converter copper in British Columbia was less than in 1921, but the recovery and rise in price of copper did not occur until about the middle of the year and some important copper mines which were active in 1921 did not appear on the shipping list until nearly the close of the year when there was a decided improvement in the copper industry. The inactivity of the smelting departments of the International Nickel Company in the earlier part of the year and of the British America Nickel Corporation throughout the entire year accounted for the small production of nickel.

The increase in the output of zinc was further emphasized by the rise in price of this metal to an average of 5.716 cents per pound for the year, as compared with 4.655 cents in 1921, both quotations from the St. Louis market. The 6 per cent increase in quantity resulted in a 30.1 per cent advance in the total value reported.

The year-end saw a marked revival in the production of cobalt which raised the year's production to 569,960 pounds valued at \$1,852,370. Compared with 1921 data, these figures showed 126.1 per cent greater quantity and 145.0 per cent increase in value.

Among the non-metallics the output of coal, considering the great loss of time through strikes, was most encouraging.

The output of coal from Canadian mines during twelve months of the calendar year 1922 was 15,157,431 tons valued at \$65,518,497 as compared with 15,057,493 tons valued at \$72,451,656 in 1921; 16,946,764 tons valued at \$82,496,538 in 1920; and 13,919,096 tons, valued at \$55,622,670 in 1919. The great strike which tied up the United States coal mines for several months was reflected in Canada and resulted in a loss of 1,222,288 working days. Fifteen disputes between employees and employers occurred in the coal-mining industry in Canada during the twelve months ending December, thirteen of which were in Alberta and southeastern British Columbia, and the other two in Nova Scotia. In all 25,251 men were affected, and of the time lost, 931,960 days were lost in the strike which began on April 1st, and 290,328 days' time was lost in the short strikes originating later in the year. Having in mind the fact that over one million working days' time was lost by the employees of the coal mining industry during the year, the output of fifteen million tons may be considered quite satisfactory. Alberta coal mine output amounted to 5,990,911 tons, a little more than half of which was lignite and nearly all the balance bituminous. Nova Scotia contributed 5,569,072 tons and occupied second place among the coal-producing provinces. British Columbia accounted for 2,927,033 tons, and Saskatchewan and New Brunswick followed with 382,437 tons and 287,513 tons respectively.

Sales of cement during the year reached a total of 6,943,972 barrels or 1,191,087 barrels more than in the previous year, the production being about evenly divided between the plants in the provinces of Ontario and Quebec. Eleven plants were operated during the year.

The manufacture of clay products in Canada including brick, firebrick, fireclay, fire-proofing, hollow building blocks, sewerpipe, pottery, terra-cotta and drain tile was carried on in 232 plants in Canada during 1922, in which the total capital employed amounted to \$31,168,903. Production showed a 29 per cent increase over the preceding year's production to a total of \$11,438,456.

Building stone, both rough and dressed, was produced in greater quantity than in 1921 and monumental and ornamental stone also showed improvement in the quantity and value of the output. The kinds of stone quarried in Canada were granite (trap rock, syenite and other igneous rocks), limestone, sandstone, and marble. Total production of all grades was valued at \$5,989,864.

The output of natural gas from Canadian fields in 1922 amounted to 14,682,651 thousand cubic feet valued at \$5,846,601. The output was greater than in the preceding year and the total value assigned showed a very great increase, due to the fact that the price of the gas to the consumer was used in computing the value in 1922, whereas in previous years the values given were those reported as received by the producer. The difference in these quotations is accounted for by the existence of pipe-line companies who purchase gas from the producers and distribute it to a large number of individual consumers scattered over wide areas.

Asbestos mining in Quebec, in common with other asbestos-producing countries of the world, suffered a decline in 1921 which continued throughout the first half of 1922. Towards the close of the year there was a considerable revival in this industry and the production was much better than at any time previously in the last two years. The reduction in the percentage of royalty taxes imposed by the Provincial Government on all asbestos produced and sold will undoubtedly prove quite a stimulus to the industry as a whole. The manufacture of finished asbestos products is being looked forward to as a coming important industry in the province of Quebec, and the making of asbestos papers, shingles, brake linings and such other products will provide a more extensive outlet for the production than the export of the crude material. The amount of asbestos sold in 1922 was 76.4 per cent higher than in the previous year and sales amounted to 163,706 tons for which the producers received \$5,552,723.

Sand and gravel production in 1922 was valued at \$3,502,935, an increase of approximately 38 per cent over the value of the output in the preceding year. The tonnages produced in both years were about the same. Owing to the widely distributed deposits of sand and gravel in Canada, a great many pits were operated and the products included sands for building purposes, for foundry use, for the manufacture of glass and also very largely for the ballasting of railroad beds, and repairs to existing mines.

The production of lime increased 30.4 per cent in quantity and 13.8 per cent in value above the amounts reported for the preceding year. The improvement in the construction industry was largely responsible for the betterment of the production in the lime-burning industry.

The production of gypsum in recent years has contributed appreciably to the mineral production of Canada and in 1922 the sales were 44.6 per cent greater in quantity than in the previous year and the total value showed an advance of 21 per cent to \$2,160,898. Production included lump or mine run, crushed, fine-ground and calcined gypsum sold, and calcined gypsum used in the calcining plants for the production of wall-plaster, alabastine and other gypsum products.

Ontario continued to be the chief producer of salt, contributing 97.2 per cent of the total sales for Canada. The 1922 production from all sources showed an increase of approximately seventeen thousand tons in quantity, although declining prices resulted in a decrease in the value of total sales amounting to about forty-five thousand dollars.

The increase in the production of metals during the year amounting to \$12,442,475 in value marks a resumption of progress in the metal-mining field and points the way to greater prosperity. The slight decline in the production of non-metallics including coal amounted to \$4,865,888 in value and since the greater part of this decrease was due to loss of production, caused through labour troubles, the slight set-back may be regarded as negligible. In the successful marketing of structural materials and clay products the revival of the building industry played a great part and during the year the production of these materials was considerably increased.

The recovery in mineral production as a whole to a total value of \$184,297,242 may be considered as most propitious. Comparison with preceding years shows that 1920, 1918 and 1917 were the only years in which this valuation was exceeded.

Mineral Statistics.—There is some variation in the methods used by the several Provincial Governments in computing the value of the metallic mineral output. In the province of British Columbia the accepted method is "to determine as the value of the metal production of the province the amount of ore for which the smelter or mill returns have been received during the year." In Ontario, the general plan is the same except that the Provincial Government officers do not complete the compilation of the final reports for the year until full returns have been received by the mine operators from the smelters to which shipments were made. The practice in Quebec and the other provinces is similar to that followed in Ontario.

There seems to be reasonably complete agreement between the representatives of each of the provinces and of the Dominion in regard to reports on the production of non-metallic minerals and structural materials.

The apparent discrepancies between the mineral production reports issued from the Dominion Government and from the several Provincial Governments may be accounted for by the statement that different points of view have been held as to methods of procedure with the result that the questionnaires from the several offices have called for different information and even when the same data have been asked for, varying methods of compilation have been used in order to present to the reader the particular points of view held by the different offices.

The value of the mineral production of a province may be computed as the receipts by the mine and smelter operators from the mining and smelting industry in that province or it may be determined as the part of the world's mineral production contributed by the mines of the province. For many ores, return is made by a smelter for possibly one or two of the principal metals contained, and the mine operator is paid on this basis. Valuable by-products obtained by the smelter may be sold by it either as the finished product of commerce, or in the form of concentrates or residues. Again, as in the case of nickel, it may be that the Canadian smelter disposes of its product in the form of matte which has subsequently to be refined elsewhere.

For statistical and comparative purposes, it has always been customary to determine the value of the metals, copper, gold, silver, lead, nickel, and zinc as far as possible on the basis of the quantities of metals recovered from Canadian ores smelted during the year, either in Canada or abroad and to compute the value of this production in each case at the average price of the refined metal in a recognized market. The value of the non-metallics, and of the structural materials was determined as the value received by the producer at point of shipment. In this report, no departure has been made from the practice previously followed. The New York market was used in the case of the principal metals since most sales of Canadian products are made on that market.

While the foregoing plan results in data being obtained which show the value in the world's markets of the principal metals produced from Canadian ores during the year, it is possible to compute another set of figures showing more closely the actual returns to the companies operating mines or reduction plants. As an example of this method, Table 15 has been computed for Ontario, and while only Ontario production has been thus recorded, the table serves to present the method which, it is possible, may be applied to the returns from the other provinces in subsequent years, providing that the plan meets with general approval. Thus, two series of provincial tables would be shown; one presenting the production data at world market values; the other, indicating the return to the mine and smelter operators of the province.

In making up this statement for Ontario, the actual quantities sold have been recorded with the values as reported by the shippers. This record shows the net value accruing to the mine and smelter operators. Care has been taken to avoid possible duplication among the items in the table by including in the compilation for each item only the data supplied by the last operator in the province through whose hands the commodity passed. For example, concentrates shipped out of the province directly from a mine, have been valued at the sum received by the mine operator, f.o.b. shipping point; on the other hand, when a mine operator shipped to a smelter in Ontario, no record of such shipments were included but the shipments of products from the smelters have been given in detail.

The whole problem of the co-ordination of mineral statistics has been under study in the Bureau for some time and several improvements in procedure have already been introduced.

Table 3.—Exchange Table showing the amount paid in Canadian dollars for one United States dollar by months, 1920, 1921 and 1922

Month	1920	1921	1922
	\$	\$	\$
January.....	1.1056	1.1437	1.0553
February.....	1.1497	1.1362	1.0351
March.....	1.1178	1.1337	1.0297
April.....	1.1112	1.1216	1.0208
May.....	1.1134	1.1164	1.0125
June.....	1.1381	1.1294	1.0138
July.....	1.1134	1.1328	1.0091
August.....	1.1275	1.1168	1.0023
September.....	1.1075	1.1106	0.9998
October.....	1.1016	1.0931	1.0011
November.....	1.1231	1.0904	0.9998
December.....	1.1643	1.0687	0.9966
Average for the year.....	1.1227	1.1161	1.0145

Table 4.—Metal Prices

	Market	Unit	1918	1919	1920	1921	1922
			\$	\$	\$	\$	\$
Antimony (ordinaries).....	New York.....	Pound....	0-12581	0-08190	0-08490	0-04957	0-05471
Arsenic, white.....	".....	".....	0-09	0-10	0-11	0-08850	0-08500
Cobalt.....	".....	".....	2-50	2-50	2-50	3-00	3-25
Cobalt oxide.....	".....	".....	1-65	1-65	—	—	2-00
Copper.....	".....	".....	0-24628	0-18691	0-17456	0-12502	0-13382
Lead.....	New York.....	".....	0-07413	0-05759	0-07957	0-04545	0-05734
".....	Montreal*.....	".....	0-09250	0-06966	0-08940	0-05742	0-06219
Nickel.....	New York*.....	".....	0-4625	0-45	0-45	0-35	0-35
Platinum.....	".....	Ounce.....	105-95	114-61	110-9	75-033	97-618
Silver.....	".....	".....	0-96772	1-11122	1-009	0-62654	0-67528
Tin.....	".....	".....	0-88750	0-63328	0-48273	0-28576	0-31831
Zinc.....	St. Louis*.....	".....	0-07890	0-06988	0-07671	0-04655	0-05716

*Quotations used in this report in computing value of mineral production.

Table 5.—Prices of Non-Metallic Minerals and Structural Materials, 1918-1922, showing the average returns received by producers, f.o.b. shipping points in Canada as computed from the total receipts and total shipments for the year

Commodity	Unit	1918	1919	1920	1921	1922
NON-METALLIC		\$	\$	\$	\$	\$
Actinolite.....	Ton.....	11 00	11 00	11 60	12 50	11 50
Asbestos.....	".....	56 68	68 93	74 12	52 89	33 92
Barytes.....	".....	15 88	17 42	30 60	35 43	33 00
Chromite.....	".....	39 42	26 80	22 82	19 90	15 00
Coal.....	".....	3 68	3 99	4 86	4 81	4 32
Corundum.....	".....	190 59	.....	125 24	138 87	.....
Feldspar.....	".....	6 00	5 87	7 42	7 73	8 96
Fluorspar.....	".....	21 19	19 32	21 40	24 69	22 68
Graphite.....	".....	79 91	73 69	75 62	70 29	52 52
Grindstones.....	".....	27 01	29 96	36 06	50 00	43 52
Gypsum.....	".....	5 40	4 06	4 41	4 62	3 86
Magnesite.....	".....	25 82	29 14	27 90	21 80	26 78
Magnesium sulphate.....	".....	7 47	12 35	20 49	19 47	23 52
Manganese.....	".....	14 16	21 42	16 99	50 00	28 00
Mica.....	".....	363 52	99 41	170 69	99 80	45 46
Mineral water.....	Gal.....	.....	.....	.....	0 07	0 06
Natro-alunite.....	Ton.....	.....	.....	.....	50 00	50 00
Natural gas.....	M. cu. ft.....	0 22	0 21	0 25	0 33	0 40
Oxides, iron.....	Ton.....	6 49	9 56	8 26	10 34	15 18
Peat.....	".....	.....	6 65	4 10	4 00	4 83
Petroleum, crude.....	Bbl.....	2 90	3 06	4 19	3 42	3 41
Phosphate.....	Ton.....	8 57	13 79	.....	15 00	9 45
Pyrites.....	".....	4 14	2 96	4 12	3 62	4 10
Quartz.....	".....	2 34	5 55	3 65	3 12	1 90
Salt.....	".....	9 75	9 43	7 36	10 16	8 96
Sodium sulphate.....	".....	.....	.....	24 04	30 25	23 76
Talc.....	".....	6 56	6 24	7 70	14 28	14 28
Tripolite.....	".....	25 00	20 00	33 08	33 00	26 39
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement, portland and puzzolan.....	Bbl.....	1 97	1 96	2 22	2 47	2 22
Clay products—						
Bricks, common.....	M.....	11 39	13 21	15 94	16 18	15 99
Bricks, pressed.....	".....	15 91	17 52	23 54	21 47	20 31
Bricks, hollow building.....	".....	29 16	38 65	.....	48 88	91 72
Bricks, moulded and ornamental.....	".....	79 26	27 95	21 03	25 35	20 68
Firebrick.....	".....	.....	.....	.....	53 85	37 55
Fireclay.....	Ton.....	8 07	8 34	12 05	10 18	5 41
Fireproofing and hollow porous blocks.....	".....	8 07	8 34	12 05	.....	.....
Kaolin.....	".....	22 36	18 11	22 00	15 23	14 92
Paving brick.....	M.....	.....	.....	.....	.....	39 81
Sewer-pipe.....	Ton.....	19 13	17 10	26 31	.....	23 26
Tile, drain.....	M.....	25 27	30 71	38 73	.....	27 65
Lime.....	Bush.....	0 29	0 32	0 41	0 40	0 35
Sand and gravel.....	Ton.....	0 21	0 26	0 37	0 22	0 30
Stone—						
Granite.....	Ton.....	.....	.....	.....	2 94	3 24
Limestone.....	".....	.....	.....	.....	1 55	1 32
Marble.....	".....	.....	.....	.....	104 67	121 28
Sandstone.....	".....	.....	.....	.....	2 75	3 20

Table 6.—Annual Values of the Mineral Production in Canada since 1886

Year	Value of production	Value per capita
	\$	\$
1886.....	10,221,255	2.23
1887.....	10,321,331	2.23
1888.....	12,518,894	2.67
1889.....	14,013,113	2.96
1890.....	16,763,353	3.50
1891.....	18,976,616	3.92
1892.....	16,623,415	3.39
1893.....	20,035,082	4.04
1894.....	19,931,158	3.98
1895.....	20,505,917	4.05
1896.....	22,474,256	4.38
1897.....	28,485,023	5.49
1898.....	38,412,431	7.32
1899.....	49,234,005	9.27
1900.....	64,420,877	12.04
1901.....	65,797,911	12.16
1902.....	63,231,836	11.36
1903.....	61,740,513	10.83
1904.....	60,082,771	10.27
1905.....	69,078,999	11.49
1906.....	79,286,697	12.81
1907.....	86,865,202	13.75
1908.....	85,557,101	13.16
1909.....	91,831,441	13.70
1910.....	106,823,623	14.93
1911.....	103,220,994	14.32
1912.....	135,048,296	18.33
1913.....	145,634,812	19.35
1914.....	128,863,075	16.75
1915.....	137,109,171	17.44
1916.....	177,201,534	22.05
1917.....	189,646,821	23.18
1918.....	211,301,897	25.37
1919.....	176,686,390	20.84
1920.....	227,859,665	26.40
1921.....	171,923,342	19.56
1922.....	184,297,242	20.55

MINERAL PRODUCTION OF CANADA (PER CAPITA)

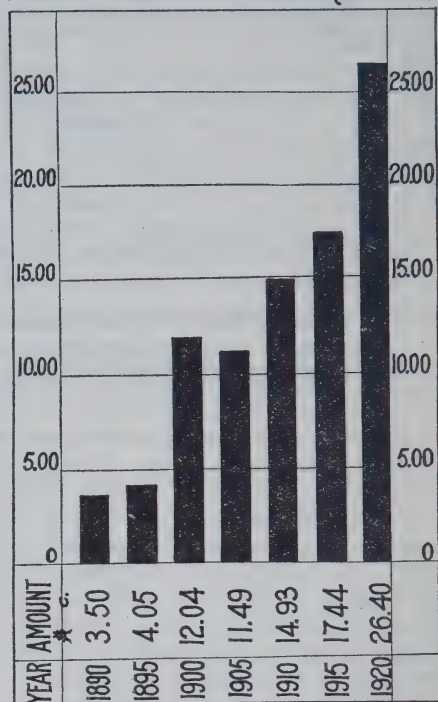


Table 7.—Annual Values of Metallic and Non-Metallic Mineral Production of Canada since 1907

Year	Metallic	Non-Metallic		Total
		Fuels and other non-metallics	Structural materials and clay products	
	\$	\$	\$	\$
1907.....	42,426,607	31,275,546	12,863,049	(a) 86,865,202
1908.....	41,774,362	32,142,784	11,339,955	(a) 85,557,101
1909.....	44,156,841	31,141,251	16,533,349	91,831,441
1910.....	49,438,873	37,757,158	19,627,592	106,823,623
1911.....	46,105,423	34,405,960	22,709,611	103,220,994
1912.....	61,172,753	45,080,674	28,794,869	135,048,296
1913.....	66,361,351	48,463,709	30,809,752	145,634,812
1914.....	59,386,619	43,467,229	26,009,227	128,863,075
1915.....	75,814,841	43,373,571	17,920,759	137,109,171
1916.....	106,319,365	53,414,983	17,467,186	177,201,534
1917.....	106,455,147	63,354,363	19,837,311	189,646,821
1918.....	114,549,152	77,621,946	19,130,799	211,301,897
1919.....	73,262,793	76,002,087	27,421,510	176,686,390
1920.....	77,939,630	108,027,947	41,892,088	227,859,665
1921.....	49,343,232	87,842,682	34,737,428	171,923,342
1922.....	61,785,707	82,976,794	39,534,741	184,297,242

(a) Total includes \$300,000 allowed for products not reported.

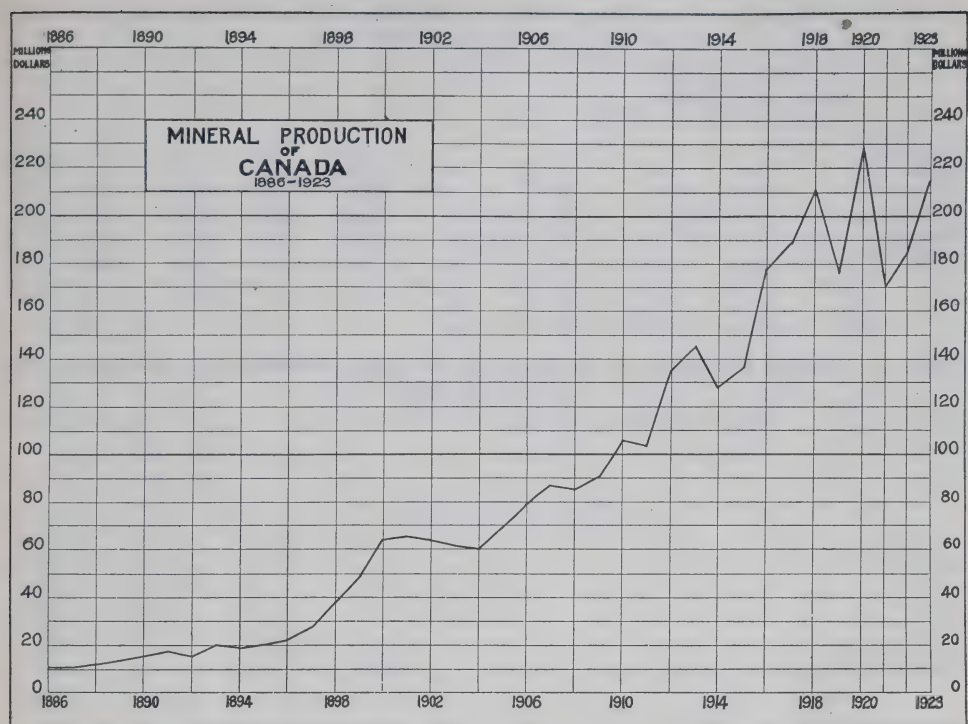


Table 8.—Values of the Mineral Production of Canada by Provinces, 1899-1922

Year	Nova Scotia*	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Yukon	British Columbia
	\$	\$	\$	\$		\$			\$
1899.....	6,817,274	420,227	2,585,635	9,819,557		17,108,707			12,482,605
1900.....	9,298,479	439,060	3,292,383	11,258,099		23,452,330			16,680,526
1901.....	7,770,159	467,985	3,759,984	13,970,010		19,297,940			20,531,833
1902.....	10,686,549	607,129	3,743,636	14,619,091		16,127,400			17,448,031
1903.....	11,431,914	580,495	3,585,938	14,160,033		14,082,986			17,899,147
1904.....	11,212,746	559,913	3,688,482	12,582,843		12,713,613			19,325,174
1905.....	11,507,047	559,035	4,405,975	18,833,292		11,387,642			22,386,008
1906.....	12,894,303	646,328	5,242,058	25,111,682		10,092,726			25,299,600
1907.....	14,532,040	664,467	6,205,553	30,381,638	898,775	533,251	4,657,524	3,335,898	25,656,056
1908.....	14,487,108	579,816	6,372,949	30,623,812	584,374	413,212	5,122,505	3,669,290	23,704,035
1909.....	12,504,810	657,035	7,086,265	37,374,577	1,193,377	456,246	6,047,447	4,032,678	22,479,006
1910.....	14,195,730	581,942	8,270,136	43,538,078	1,500,359	498,122	8,996,210	4,764,474	24,478,572
1911.....	15,409,397	612,830	9,304,717	42,796,162	1,791,772	636,706	6,662,673	4,707,432	21,299,305
1912.....	18,922,236	771,004	11,656,998	51,985,876	2,463,074	1,165,642	12,073,589	5,933,242	30,076,635
1913.....	19,376,183	1,102,613	13,475,534	59,167,749	2,214,496	881,142	15,054,046	6,276,737	28,086,312
1914.....	17,584,639	1,014,570	11,836,929	53,034,677	2,413,489	712,313	12,684,234	5,418,185	24,164,039
1915.....	18,088,342	903,467	11,619,275	61,071,287	1,318,387	451,933	9,909,347	5,057,708	28,689,425
1916.....	20,042,262	1,118,187	14,406,598	80,461,323	1,823,576	590,473	13,297,543	5,491,610	39,969,962
1917.....	21,104,542	1,435,024	17,400,077	89,066,600	2,628,264	860,651	16,527,535	4,482,202	36,141,926
1918.....	22,317,108	2,144,017	19,605,347	94,694,093	3,120,600	1,019,781	23,109,987	2,355,631	42,935,333
1919.....	23,445,215	1,770,945	21,267,947	67,917,998	2,868,378	1,521,964	21,087,582	1,940,934	34,865,427
1920.....	34,130,017	2,491,787	28,886,214	81,715,808	4,223,461	1,837,468	33,586,456	1,576,726	39,411,728
1921.....	28,912,111	1,901,505	15,157,094	57,356,651	1,934,117	1,114,220	30,562,229	1,754,955	33,230,460
1922.....	25,923,499	2,263,692	17,647,939	65,866,029	2,258,942	1,255,470	27,872,136	1,785,573	39,423,962

*Includes a small production from Prince Edward Island.

Table 9.—Percentage of the Total Value of the Mineral Production of Canada produced by each Province, 1918-1922

Province	1918	1919	1920	1921	1922
Nova Scotia.....	10.56	13.27	14.98	16.82	14.12
New Brunswick.....	1.01	1.00	1.09	1.10	1.23
Quebec.....	9.28	12.04	12.68	8.82	9.57
Ontario.....	44.82	38.44	35.86	33.36	35.74
Manitoba.....	1.53	1.62	1.85	1.12	1.23
Saskatchewan.....	0.48	0.86	0.81	0.65	0.67
Alberta.....	10.94	11.94	14.74	17.78	15.13
British Columbia.....	20.27	19.73	17.30	19.33	21.39
Yukon.....	1.11	1.10	0.69	1.02	0.92
	100.0	100.0	100.0	100.0	100.0

Table 10.—Values by Classes of Products of the Mineral Production of Canada, by Provinces, 1922

	Metallic	Non-Metallic	Structural Materials and Clay Products	Total
	\$	\$	\$	\$
Nova Scotia.....	21,598	25,285,789	616,112	25,923,499
New Brunswick.....		1,846,133	417,559	2,263,692
Quebec.....	1,410	6,041,067	11,605,462	17,647,939
Ontario.....	37,937,252	7,669,350	20,259,427	65,866,029
Manitoba.....	3,239	440,974	1,814,729	2,258,942
Saskatchewan.....		814,033	441,437	1,255,470
Alberta.....		26,026,146	1,845,990	27,872,136
British Columbia.....	22,041,285	14,848,632	2,534,025	39,423,962
Yukon Territory.....	1,780,923	4,650		1,785,573
Canada.....	61,785,707	82,976,794	39,534,741	184,297,242

MINERAL PRODUCTION OF CANADA
1907-1922

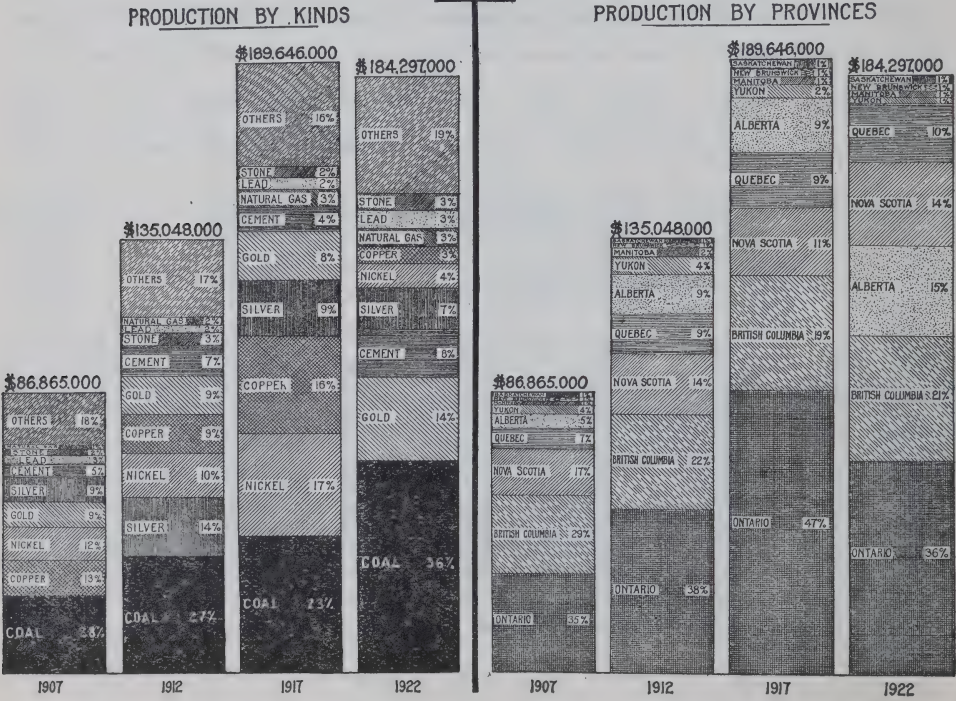


Table 11.—Mineral Production of Nova Scotia, 1920, 1921 and 1922

	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLIC—		\$		\$		\$
Gold..... Fine oz.	690	14,263	*465	9,091	*1,128	21,598
Non-METALLIC—						
Barytes..... Tons	751	22,983	270	9,567	289	9,537
Coal.....	6,429,291	32,238,129	5,734,928	27,782,050	5,569,072	24,629,921
Feldspar..... "			16	117		
Grindstones..... "	211	8,440	183	6,990	102	3,692
Gypsum.....	260,661	573,752	206,831	511,883	332,404	580,148
Manganese..... "	62	4,140	68	3,400	73	2,044
Salt.....	3,023	32,000	2,638	23,269	5,053	54,666
Tripolite..... "	260	8,600	341	11,268	219	5,781
STRUCTURAL MATERIALS AND CLAY PRODUCTS—						
Clay Products.....		541,114		361,761		431,618
Lime..... Bush	201,500	40,300	25,914	6,085		
Stone..... Tons		420,175	58,923	116,602	87,955	119,492
Other products.....		226,121	†	70,028	†	65,002
Total.....		34,130,017		25,912,111		25,923,499

*Includes 25 oz. silver, value \$16 in 1921, and 86 ounces silver, value \$58 in 1922.

†Includes railway ballast from P.E.I., \$1,433, in 1921; and \$10,028 in 1922.

Table 12.—Mineral Production of New Brunswick, 1920, 1921 and 1922

Product	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
Non-METALLIC—		\$		\$		\$
Coal..... Tons	166,048	1,055,286	187,192	920,666	287,513	1,107,643
Grindstones..... "	2,233	79,696	1,098	57,077	903	40,050
Gypsum.....	49,405	428,183	54,030	360,220	82,462	517,668
Natural gas..... M cu. ft.	682,502	130,506	708,743	139,375	753,898	148,040
Petroleum..... Bbl.	5,148	19,963	7,479	33,022	7,778	32,732
STRUCTURAL MATERIALS—						
Clay products.....		73,484		66,600		75,425
Lime..... Bush	701,859	365,030	562,447	203,084	560,834	187,895
Stone..... Tons		280,167	15,125	97,290	12,027	104,730
Sand and gravel..... "		59,472	239,192	24,171	448,322	49,509
Total.....		2,491,787		1,901,505		2,263,692

Table 13.—Mineral Production* of Quebec, 1920, 1921 and 1922

Product	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLIC—						
Copper..... Lb.	880,638	153,724	352,308	44,045		
Gold Ozs.	955	19,742	635	13,127		
Iron ore, sold for export.....Tons	960	3,000			526	1,410
Lead..... Lb.	905,472	80,949	595,881	34,215		
Molybdenite..... "						
Silver..... Ozs.	61,003	61,552	38,084	23,861		
Zinc..... Lb.	1,120,200	85,931				
NON-METALLIC—						
Asbestos and asbestic.....Tons	199,573	14,792,201	92,761	4,906,230	163,706	5,552,723
Chromite..... "	11,016	251,379	2,798	55,696	767	11,503
Feldspar..... "	649	10,052	9,737	80,180	12,472	127,826
Graphite... "	233	31,913	38	2,423	24	1,500
Magnesite..... "	18,378	512,756	2,927	74,109	2,849	76,294
Mica..... "		281,460	484	41,172	1,360	97,748
Mineral water.....Gal.	24,219	10,109	19,626	7,278	12,161	3,692
Iron oxides.....Tons	19,128	157,909	8,879	92,765	7,282	110,488
Phosphate..... "			30	450	131	1,320
Pyrites..... "	14,817	44,451	1,986	10,463		
Quartz..... "	1,986	5,558	5,994	29,824	10,994	53,023
Talc..... "	150	1,050			150	4,950
STRUCTURAL MATERIALS—						
Cement.....Bbl.	3,013,463	6,545,054	2,135,631	5,410,275	2,660,935	5,907,300
Clay products.....		2,361,007		1,742,872		2,476,370
Kaolin.....Tons	683	15,022	124	1,888	1,197	17,866
Lime—						
Quicklime .....Bush.	† 2,108,203	826,044	1,940,594	754,375	2,108,513	634,157
Hydrated lime.....Tons			3,495	36,128	5,278	55,642
Slate..... "	(a)	14,200	(b)	22,325	1,899	14,871
Stone..... "		2,189,325	719,499	1,662,641	987,355	2,342,316
Sand and gravel..... "		431,826	700,669	110,752	905,101	156,940
Total		28,886,214		15,157,094		17,647,939

*There is also in this Province an important production of aluminium from imported ores.

†Bushels.

(a) 1,532 squares, and 240 tons of crushed material.

(b) 415 squares and 2,232 tons crushed material.

Table 14.—Mineral Production of Ontario, 1920, 1921 and 1922

Product	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLIC—						
Cobalt..... Lb.	546,023	1,365,058	251,986	755,958	569,960	1,852,370
Copper..... " 32,059,993	5,596,392	12,821,385	1,602,030	10,943,636	1,484,477	
Gold..... Ozs.	564,995	11,679,483	708,213	14,640,062	1,000,340	20,678,862
Iron ore, sold for export..... Tons	6,683	54,266	48	242		
Iron, pig, from Canadian ore (a)..... " 75,869	2,066,997	56,564	1,873,682	8,095	178,980	
Lead..... Lb.	2,255,520	201,643	3,312,493	190,203	2,890,397	180,216
Nickel..... " 61,335,706	24,534,282	19,293,060	6,752,571	17,597,123	6,158,993	
Platinum..... Ozs.	578	36,961	269	20,184	458	44,709
Palladium..... " 913	58,392	591	38,267	724	47,060	
Rhodium, ruthenium, osmium..... " 513	31,815	57	9,690	391	31,280	
Silver..... Ozs.	9,907,626	9,996,795	9,761,607	6,116,037	10,811,903	7,300,305
Zinc..... Lb.	13,950	1,070				
NON-METALLIC—						
Actinolite..... Tons	100	1,160	78	975	50	575
Arsenious oxide..... " 1,831	425,617	1,491	233,763	2,058	299,940	
Corundum..... " 196	24,547	403	55,965			
Feldspar..... " 37,224	270,843	20,115	150,457	15,255	120,576	
Fluorspar..... " 3,758	68,475	116	1,744	284	3,905	
Graphite..... " 1,957	133,704	899	63,439	573	29,853	
Gypsum..... " 74,707	404,162	84,790	433,053	110,227	621,668	
Mica..... " 1,466	94,562	218	28,891	1,989	54,515	
Mineral water..... Imp. gal		14,473	308,647	14,438	209,072	10,528
Natural gas..... M. cu. ft	10,529,374	2,920,731	8,422,774	3,080,130	8,060,114	4,076,296
Peat..... Tons	4,550	18,650	1,666	6,664	3,000	14,500
Petroleum..... Bbl.	180,071	726,286	172,859	559,198	164,732	526,316
Phosphate..... Tons					59	476
Pyrites..... " 148,652	618,283	27,785	101,306	11,233	39,763	
Quartz..... " 90,433	321,063	72,068	220,806	81,528	118,054	
Salt..... " 206,832	1,512,724	161,987	1,649,626	176,741	1,573,657	
Strontium..... " 75	2,625					
Talc..... " 21,411	162,784	9,967	140,390	12,854	178,728	
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement..... Bbl.	2,035,594	4,377,814	2,723,071	6,424,356	3,104,386	6,393,566
Clay products..... " 5,613,488		5,183,125		5,183,125		6,944,218
Lime—						
Quicklime..... Bush.	(b) 5,109,635	1,962,086	2,763,062	962,439	3,939,954	1,311,563
Hydrated..... Tons			26,862	381,749	36,408	455,980
Sand-lime brick..... No.	30,664,720	451,175				
Stone..... Tons		4,035,478	2,716,080	4,167,582	2,317,265	2,969,926
Sand and gravel..... " 1,931,924		6,273,173	1,496,729	6,285,123		2,184,174
Total.....		81,715,808		57,356,651		65,866,02

(a) The total production of blast-furnace pig-iron in Ontario in 1920 was 749,068 tons, valued at \$22,252,062; in 1921, 494,901 tons valued at \$11,856,352, and in 1922, 293,662 tons valued at \$6,493,513.

(b) Bushels.

Table 15.—Sales and Shipments from the Mineral Industries of Ontario. (Quantities shown are final shipments during the year; values given are those reported as received, f.o.b. shipping point, by the shippers.)

Metal Mining Industries		Quantity	Marketed value as reported
			\$
SILVER-COBALT INDUSTRY—			
Sold by South Ontario smelters—			
Silver bullion.....	Ozs.	1,814,874	1,245,329
Arsenic*.....	Tons	2,058	299,940
Cobalt oxide.....	Lb.	398,696	798,271
Cobalt metal.....	"	109,067	282,602
Nickel oxide.....	"	10,047	1,721
Nickel metal.....	"	106,318	31,035
Nickel sulphate.....	"	27,270	2,230
Mixed oxides.....	"	123,605	99,687
Copper sulphate.....	"	22,553	1,310
Arsenate of iron.....	Tons	38	938
Matte.....	"		38,050
Residues exported.....	Tons	460	153,116
Sold direct from Ontario silver mines—			
Silver bullion.....	Ozs.	7,526,646	5,125,802
Ores, concentrates and residues exported.....	Tons	1,528	391,250
Total for Silver-Cobalt Industry.....			8,471,281
NICKEL-COPPER INDUSTRY—			
Matte exported.....	Tons	19,831	3,681,503
Refined nickel.....	"	5,533	3,140,399
Nickel oxides.....	"	1,195	389,398
Converter copper.....	"	2,191	502,293
Precious metals.....	"		13,663
Total for Nickel-Copper Industry.....			7,727,256
GOLD MINING INDUSTRY—			
Crude bullion.....	Ozs.	1,259,378	20,745,268
Exchange premium.....	"		208,717
Slags exported.....	Tons	33	13,484
Total for Gold-Mining Industry.....			20,968,469
LEAD MINING AND SMELTING INDUSTRY—			
Lead bullion.....	Lb.	2,860,715	178,366
IRON MINING AND SMELTING INDUSTRY—			
Pig iron from Ontario ores.....	Tons	8,095	178,980
Totals—			
(a) Metal Mining and Smelting Industries.....			37,524,352
(b) Non-Metallic Mineral Industries, as per Table 14.....			7,369,410
(c) Structural Materials and Clay Products Industries, as per Table 14.....			20,259,427
Grand Total of Sales.....			65,153,189

*In Table 14 arsenic is included with Non-Metallies.

Table 16.—Mineral Production of Manitoba, 1920, 1921 and 1922

Product	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLIC—						
Copper.....	Lb.	\$ 3,062,577		\$		\$
Gold.....	Ozs.	781	207	4,279	156	3,225
Silver.....	"	15,510	33	20	20	14
NON-METALLIC—						
Gypsum.....	Tons	44,371	40,859	480,282	34,072	440,914
Natural gas.....	M cu. ft.	200	200	60	200	60
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Clay products.....		206,764		208,982		210,740
Lime.....	Bush.	605,399	413,283	136,375	382,184	163,799
Sand-lime brick.....	No.	10,278,802				
Stone.....	Tons	374,286	16,868	56,666	34,359	106,638
Other products*		2,179,341		1,047,453		1,333,552
Total.....		4,223,461		1,934,117		2,258,942

*Includes cement and sand and gravel.

Table 17.—Mineral Production of Saskatchewan, 1920, 1921 and 1922

Product	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
Non-METALLIC—						
Coal..... Tons	343,475	819,320	335,632	823,180	382,437	802,053
Magnesium sulphate..... " 2		103	2	120		
Salt..... " 33				790		
Sodium sulphate..... " 811		19,496	624	18,850	504	11,980
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Clay products.....		471,448		166,244		134,704
Sand-lime brick (a)..... No.	2,258,500	35,383				
Sand and gravel..... Tons		491,718		105,036	924,944	306,733
Total.....		1,837,468		1,114,220		1,255,470

(a) Sand-lime brick not included under Mineral Production in 1921 and 1922.

Table 18.—Mineral Production of Alberta, 1920, 1921 and 1922

Product	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLIC—						
Gold, alluvial..... Ozs.			49	1,013		
Non-METALLIC—						
Coal..... Tons	6,833,500	29,849,608	5,909,217	27,246,514	5,990,911	24,351,913
Natural gas..... M cu. ft.	5,633,442	1,181,345	4,945,884	1,374,599	5,867,459	1,622,105
Petroleum..... Bbl.	11,032	75,986	7,203	49,313	5,608	52,128
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Clay products.....		786,430		710,477		700,063
Lime..... Bush.	139,433	72,477	107,083	48,332	130,627	71,328
Sand-lime brick..... No.	2,257,000	40,626				
Stone..... Tons		4,415	2,962	13,750	554	7,300
Other products*.....		1,575,569		1,118,231		1,067,299
Total.....		33,586,456		30,562,229		27,872,136

*Includes cement and sand and gravel.

Table 19.—Mineral Production of British Columbia, 1920, 1921 and 1922

Product	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLIC—						
Copper (a)..... Lb.	45,319,771	7,911,019	34,447,127	4,306,580	31,936,182	4,273,700
Gold..... Ozs.	124,808	2,580,010	150,792	3,117,147	207,370	4,286,718
Iron ore sold for export..... Tons	1,212	7,272	1,010	3,030	1,255	3,528
Lead..... Lb.	32,792,725	2,931,670	60,298,603	3,462,346	87,093,266	5,430,265
Platinum..... Ozs.	17	719	23	1,726	12	1,154
Silver..... " 3,327,028		3,356,971	3,350,357	2,099,133	7,150,937	4,828,384
Zinc..... Lb.	38,729,762	2,970,960	53,089,356	2,471,310	56,290,000	3,217,536
Non-METALLIC—						
Arsenic..... Tons	628	22,231			518	21,097
Coal..... " 2,858,877		16,726,950	2,890,291	15,676,774	2,927,033	14,622,317
Fluorspar..... " 7,477		171,971	5,403	134,523	4,219	98,233
Gypsum..... " 40				100	100	500
Manganese..... " 587		6,889				
Magnesium sulphate..... " 1,945		39,783	2,027	39,386	1,021	24,017
Magnesite..... " 803				7,211		
Natro-alunite..... " 30				1,500		2,500
Oxides (iron)..... " 169				845	50	120
Pyrites..... " 11,275		56,376	3,597	4,557	6,908	34,540
Quartz..... " 35,876		141,200	22,288	62,317	17,425	37,521
Sodium carbonate..... " 197				14,775	202	3,027
Talc..... " 110		3,100	167	4,175	191	4,780
STRUCTURAL MATERIALS AND CLAY PRODUCTS—						
Clay products.....		596,172		415,869		447,452
Lime—						
Quicklime..... Bush.			152,998	234,779	433,716	254,320
Hydrated..... Tons	(b) 561,305	341,632	1,622	17,851	2,909	30,321
Stone..... " 276,505			142,041	229,165	197,670	324,591
Other products (c).....		1,270,298		925,361		1,477,841
Total.....		39,411,728		33,230,460		39,423,962

(a) Smelter recoveries of copper. (b) Bushels. (c) Includes cement and sand and gravel.

Table 20.—Mineral Production of Yukon, 1920, 1921 and 1922

Product	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLIC—						
Copper..... Lb.	277,712	48,478				
Gold..... Ozs.	72,778	1,504,455	65,994	1,364,217	54,456	1,125,705
Silver..... “	19,190	19,363	393,092	246,288	663,493	447,997
Lead..... Lb.			2,472,615	141,978	3,323,508	207,221
NON-METALLIC—						
Coal..... Tons	763	4,430	233	2,472	465	4,650
Total.....		1,576,726		1,754,955		1,785,573

METALLICS

ALUMINIUM

Although aluminium was economically produced in the United States as far back as 1890 the production in Canada dates only from about the year 1903, when the Northern Aluminium Company developed its plant at Shawinigan Falls, Quebec. No commercial ores of aluminium have as yet been found in Canada and the consumers are dependent entirely upon imported ores or metals. The bulk of the ore consumed is drawn from the United States, but quantities are also imported from France; it is used in the manufacture of artificial abrasives as well as a source of aluminium.

Since there is but one firm engaged in the manufacture of aluminium in Canada, statistics of production as reported to the Bureau may not be separately shown. The manufacture of aluminium cooking utensils has, however, been considerably developed during the past few years, and there are now some eight companies engaged in the industry. A separate report by this Bureau is now available on this section of the trade.

Aluminium is reduced from its ores by electrical smelting in which small quantities of the mineral cryolite (imported from Greenland), are used. The resulting ingots are remelted and moulded into slabs, which after being rolled into plates form the raw product of the kitchen utensil trade. The uses for the metal are rapidly extending and it now enters into the production of power cables, especially in long spans where a light weight is desirable; in the manufacture of automobile bodies, cream separators, the frame work of airships, chemical vats, in the production of steel, where it is important in eliminating blowholes in castings and as mentioned above for cooking utensils.

The price of ingot aluminium which on the New York market for the year 1922 averaged 18.68 cents per pound has declined gradually to this level since August, 1920, when 32.21 cents was quoted. The following table shows the average monthly prices in cents per pound.

Table 21.—Monthly Average Prices of Ingot Aluminium

(at New York in cents per pound)

Month	1920	1921	1922
January.....	32.00	27.00	17.74
February.....	31.83	28.00	17.33
March.....	31.50	28.00	17.52
April.....	31.61	28.00	18.07
May.....	31.95	28.00	17.92
June.....	32.00	28.00	17.87
July.....	32.00	26.40	17.87
August.....	32.21	24.50	17.87
September.....	31.44	24.50	18.26
October.....	29.13	24.50	20.32
November.....	27.80	24.50	20.87
December.....	23.83	20.00	22.52
Average.....	30.61	25.95	18.68

Table 22.—Imports of Alumina and Aluminium into Canada and Exports of Aluminium during 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
IMPORTS—						
Alumina.....	114,828,600	1,889,064	30,049,100	638,483	42,617,700	938,181
Aluminium—						
Ingots, blooms, bars.....	1,850,687	623,232	724,434	213,136	1,199,718	251,435
Tubing.....	20,049	10,501	15,846	8,291	34,157	16,594
Manufactures.....		394,488		258,885		315,317
Leaf foil.....		194,618		97,332		215,944
Household and hollow-ware.....		367,702		316,740		544,784
Total.....		3,479,605		1,532,867		2,282,255
EXPORTS—						
Aluminium—						
Ingots, bars, etc.....	19,716,300	6,094,628	5,399,800	1,259,703	9,614,200	1,637,147
Manufactures.....		175,057		273,401		451,587
Total.....		6,269,685		1,533,104		2,088,734

Table 23.—World's Production of Aluminium, 1913, 1918-1922

(Compiled from "The Mineral Industry, 1922")

(Short tons)

Country	1913	1918	1919	1920	1921	1922
Austria.....	5,510	8,816	5,511	2,204	2,204	4,408
Canada.....	6,519	16,530	16,530	11,020	6,612	9,918
France.....	14,880	13,249	13,444	13,224	11,020	13,224
Germany.....	882	27,550	16,530	11,020	11,020	13,224
Great Britain.....	11,020	15,428	11,020	8,816	5,510	10,469
Italy.....	963	1,890	1,844	1,364	820	694
Norway.....	2,755	8,265	4,408	5,510	4,408	6,612
Switzerland.....	11,020	16,530	16,530	13,224	11,020	13,224
United States.....	32,509	112,404	99,180	99,180	31,683	57,304
Total.....	86,058	220,662	184,997	165,562	84,297	129,077

ANTIMONY

Until the year 1917 the production of small quantities of antimony, either as ore, or as a constituent in the residues from the lead refining at Trail was more or less consistent. Since that time no production has been reported. The producers of this metal are the Consolidated Mining and Smelting Company, Trail, B.C., and the Antimony Products Corporation, formerly the North American Smelting Corporation, Limited, Lake George, N.B. This latter company, which was re-organized early in 1922, did not resume operations during that year.

The imports of antimony and antimony salts in 1922 were 421,696 pounds, valued at \$26,001, as against 640,578 pounds, valued at \$40,127, in 1921. No exports of antimony ore or regulus have been reported for the past three years.

Table 24.—Production of Antimony in Canada, 1886-1922

Calendar Year	Antimony ore		Refined regulus	
	Tons	Value	Pounds	Value
		\$		\$
1886.....	665	31,490		
1887.....	584	10,860		
1888.....	345	3,696		
1889.....	55	1,100		
1890.....	26½	625		
1891.....	10	60		
1892-1897.....				
1898.....	1,344	20,000		
1899-1904.....				
1905 (a).....	527			
1906 (a).....	782			
1907.....	2,016	65,000	63,850	5,108
1908 (b).....	148	5,443		
1909.....	35	1,575	61,207	4,285
1910.....	364	13,006		
1911-1914.....				
1915.....	1,341	81,283	59,440	11,888
1916.....	885	94,537	107,185	41,823
1917.....	361	22,000		
1918-1922.....				

(a) As recorded by the Nova Scotia Department of Mines: no value given.

(b) Exports.

Table 25.—Monthly Average Prices of Antimony, 1920, 1921 and 1922

(Compiled from quotations given in the *Engineering and Mining Journal-Press*—"Ordinaries" stand for Hungarian, Chinese, or other "Foreign" brands)

(at New York in cents per pound)

	1920	1921	1922
	Ordinaries	Ordinaries	Ordinaries
January.....	10.58	5.26	4.463
February.....	11.59	5.25	4.416
March.....	11.06	5.28	4.319
April.....	10.50	5.14	4.980
May.....	9.66	5.25	5.467
June.....	8.29	5.09	5.145
July.....	7.50	4.74	5.091
August.....	7.18	4.60	5.315
September.....	7.11	4.56	6.580
October.....	6.72	5.09	6.905
November.....	6.11	4.73	6.584
December.....	5.53	4.50	6.382
Average.....	8.49	4.96	5.471

Table 26.—Imports into Canada of Antimony, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
IMPORTS—						
Antimony or regulus of.....	1,059,249	86,803	619,287	34,641	405,646	22,340
Antimony salts.....	20,067	10,485	21,291	5,486	16,050	3,661
Total.....	1,079,316	97,288	640,578	40,127	421,696	26,001

COBALT

The cobalt production of Canada in 1922 was 569,960 pounds which at \$3.25 per pound would be worth \$1,852,370. These figures were obtained as the total of the metal cobalt contained in smelter products made in 1922 and cobalt in residues exported for treatment, valued at \$3.25 which was the average New York quotation for cobalt during the year.

Until the discovery in 1903 of the famous silver-cobalt-nickel-arsenide ores at Cobalt in Northern Ontario, the main supply of cobalt metal was drawn from the mines of Europe. Upon the opening up of the Canadian field and the consequent development of metallurgical processes for the treatment of cobalt-bearing ores by the Deloro Smelting and Refining Company at Deloro and the Coniagas Reduction Company at Thorold, the production from the Canadian mines became the source of the major portion of the world's supply. Discoveries of cobalt ores have recently been reported in other countries, and some development work has been done. Deposits were reported in the state of Oregon in the United States, in Chile and the Argentine Republic in South America, and a small shipment of cobalt ore was made in 1921 from Queensland, Australia, to Swansea, Wales. Cobalt-bearing ores have also been treated at Fredericton, Missouri, but the production of cobalt or cobalt salts from other than Canadian ores has been small.

During 1922, three smelters in Ontario treating ores¹ and residues from the Cobalt District marketed cobalt oxide, metallic cobalt, and unseparated oxides. Most of the cobalt residues from the cyanide process were treated in Canada during 1922, although some of these, as well as smelter residues amounting in all to 518 tons containing 172,311 pounds of cobalt were shipped abroad for treatment. Small quantities of the metal were also contained in concentrates exported to the United States, but the cobalt contents were not paid for.

The historical summary of the production of cobalt in Canada which dates from the year 1904 is shown in the following table. The figures given for the years 1904 to 1910 inclusive were prepared by the Ontario Bureau of Mines, and represent the estimated cobalt contents of the ores shipped from the mines. From 1911 to 1920, inclusive, the quantities given are the cobalt contents of all smelter products sold or shipped, such as cobalt metal, the oxides, mixed oxides and residues, etc. For 1922 the practice has been changed to conform with the methods used for all other metals, and the metallic contents of products *made* by the smelters rather than sales or shipments have been shown.

Table 27.—Production of Cobalt in Canada, 1904-1922

Year	Pounds	Year	Pounds	Year	Pounds
1904.....	32,000	1911.....	1,704,000	1918.....	737,157
1905.....	236,000	1912.....	663,093	1919.....	530,371
1906.....	642,000	1913.....	865,937	1920.....	546,023
1907.....	1,478,000	1914.....	871,891	1921.....	251,986
1908.....	2,448,000	1915.....	504,212	1922.....	569,960
1909.....	3,066,000	1916.....	840,536		
1910.....	2,196,000	1917.....	1,079,572		

Table 28.—Summary of Cobalt Production Statistics

		1921		1922	
		Total Quantity	Cobalt Content	Total Quantity	Cobalt Content
Ores and residues treated.....	Tons	5,141	131,673	3,719	536,400
Output of Smelters—					
Metallic cobalt.....	Lb.	22,216	22,216	106,274	106,274
Cobalt oxide.....	"	216,875	151,812	360,495	252,347
Unseparated oxides.....	"			86,730	39,028
Residues.....	"	(a)	(a)	(a)	172,311
Total.....	"				569,960
Computed Value.....					\$1,852,370
		Quantity	Value as Reported by Smelters	Quantity	Value as Reported by Smelters
Products Marketed—					
Metallic cobalt.....	Lb.	32,718	\$ 228	109,067	\$ 282,602
Cobalt oxide.....	"	165,554	354,418	398,697	798,271
Unseparated oxides.....	"	105,676	113,865	123,605	99,687
Residues.....	"	294,497	53,139	1,036,000	(b)156,402
Total.....			619,650		1,336,962

(a) Not given. (b) Estimated.

¹ The Ontario Smelters and Refineries, Limited, which was one of the three smelters operating in 1922 made an assignment.

Table 29.—Imports into Canada and Exports of Cobalt, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$
IMPORTS—						
Ore.....	600	520	100	131	200	233
Total.....	600	520	100	131	200	233
EXPORTS—						
Cobalt metal.....	304,382	493,425	60,035	141,199	111,830	288,776
Cobalt oxides and salts.....			190,483	405,300	430,024	770,511
Cobalt alloys.....	10,219	43,970	8,617	46,591	4,022	21,398
Ore.....		537,395		593,090		
Total.....		1,074,790		1,186,180		1,080,685

Table 30.—Imports of Cobalt into the United States, 1917-1922

(As given in the Preliminary Report on Mineral Resources of United States.)

Year	Cobalt, cobalt ore and zaffir		Cobalt oxide	
	Pounds	Value \$	Pounds	Value \$
1917.....	223,794	369,950	276,406	275,821
1918.....	504,391	628,099	208,596	291,699
1919.....	77,556	144,282	131,424	184,751
1920.....	156,862	331,672	202,704	399,605
1921.....	46,099	108,774	164,003	342,426
1922.....	131,559	328,471	217,530	435,895

Uses.—Prior to the war the principal demand for cobalt in the form of oxide was for colouring in the ceramic industry. A small demand for cobalt metal now exists for use in making high-speed tools, such as “stellite” an alloy of cobalt, chrome, and tungsten, or molybdenum. A small amount is used for plating and for making salts, such as cobalt sulphate and cobalt carbonate, and also for making cobalt hydroxide. Small amounts of cobalt are also used in the form of oleate and resinate of cobalt as drying agents in the manufacture of varnishes.

Prices.—The market for cobalt which was very poor in 1915, gradually improved during the war. No quotations on the New York markets were available during 1918, 1919 and 1920 and a nominal Canadian price of \$2.50 per pound has been used in this report. During 1921 the quotations given in the “*Engineering and Mining Journal-Press*” ranged from \$3 to \$3.50 per pound; the former value was used. In 1922 the average price was taken at \$3.25 per pound.

Table 31.—Monthly Average Prices of Cobalt, 1920, 1921 and 1922

	(a) London in Shillings per Pound			(b) New York in Cents per Pound		
	1920	1921	1922	1920	1921	1922
January.....	10/6	30/-	14/-	(c)	510	325
February.....	10/6	30/-	13/-	(c)	450	325
March.....	10/6	25/-	14/-	(c)	450	325
April.....	14/-	20/-	12/-	(c)	425	325
May.....	14/-	19/6	12/-	(c)	400	325
June.....	14/-	16/3	12/-	275	400	325
July.....	14/-	17/-	12/-	275	325	325
August.....	14/-	17/-	11/-	300	325	325
September.....	30/-nom.	16/7	12/-	375	325	325
October.....	30/-	15/6	12/-	600	325	325
November.....	30/-	15/6	11/-	600	325	325
December.....	30/-	15/-	11/-	600	325	325

(a) From the Metal Information Bureau, Limited, 7 East India Ave., London, E.C.

(b) From the Engineering and Mining Journal-Press, New York. (c) Not available.

Bounties.—Under the provisions of the "Metal Refining Bounty Act," passed by the Ontario Legislature in 1907, bounties were paid to refineries amounting to \$126,987.08 on cobalt metal, cobalt oxide, and salts of cobalt, and \$43,153.85 on nickel metal, nickel oxide, and salts of nickel, or a total for both cobalt and nickel of \$170,140.95. The quantities produced and the bounties paid each year are given in detail in the annual reports of the Ontario Bureau of Mines.

The bounty was at the rate of 6 cents per pound on the metallic contents of the oxides. The Act which expired in April, 1917, was not re-enacted.

COPPER

CANADA

The production of copper during 1922 amounted to 42,879,818 pounds (21,439.9 tons), which at the average New York price for the year 13.382 cents per pound) was worth \$5,738,177, as against 47,620,820 pounds (23,810.4 tons) valued at \$5,953,555, or an average price of 12.502 cents per pound in 1921. The decrease amounted to 9.9 per cent in quantity and 3.6 per cent in total value.

The 1922 production included: (a) 29,595,440 pounds contained in blister copper, a part of which was exported and a part was refined in Canada; (b) 10,851,898 pounds contained in nickel-copper matte, some of which was exported and some refined in Canada; (c) 57,708 pounds contained in copper sulphate; and (d) 2,374,772 pounds, the estimated recoveries from ores and concentrates exported for smelting and refining.

The corresponding figures for 1921 were (a) 32,122,678, (b) 12,645,391 (c) 162,111 and (d) 2,690,640.

Refined copper was produced commercially in quantity for the first time in Canada in 1916 at the Trail Refinery of the Consolidated Mining and Smelting Company. The copper rod mill completed in 1921 was not operated during the period. The British America Nickel Corporation produced refined copper at their Deschenes plant for the first time in 1920. The total production of refined copper in Canada during the past seven years was as follows:—

Calendar year	1916.....	483 tons
"	" 1917.....	3,901 "
"	" 1918.....	3,809 "
"	" 1919.....	3,467 "
"	" 1920.....	2,590 "
"	" 1921.....	2,143 "
"	" 1922.....	365 "

Copper sulphate is produced at Trail, B.C., by the Consolidated Mining and Smelting Company and at Thorold, Ont., by the Coniagas Reduction Company. The amounts produced were 179,064 pounds in 1920; 643,910 pounds in 1921 and 230,835 pounds in 1922.

Copper sulphate is a by-product in the parting of gold and silver by the action of boiling concentrated sulphuric acid, the silver being dissolved as the sulphate and recovered by precipitating it with metallic copper. Copper sulphate may also be produced by treating scrap copper with a spray of dilute sulphuric acid in the presence of air. Copper sulphate forms blue crystals soluble in water. Heated to 240° C., it loses its water of crystallization and becomes a white anhydrous powder. Blue vitriol, or copper sulphate in solution, is used in the preparation of insecticides and germicides, and for many other purposes.

Table 32.—Production of Copper in Canada, 1886-1922

Year	Pounds	Value	Cents per Pound	Year	Pounds	Value	Cents per Pound
		\$				\$	
1886.....	3,505,000	385,550	11.00	1905.....	48,092,753	7,497,660	15.590
1887.....	3,260,424	366,798	11.25	1906.....	55,609,888	10,720,474	19.278
1888.....	5,562,864	927,107	16.66	1907.....	56,979,205	11,398,120	20.004
1889.....	6,809,752	936,341	13.75	1908.....	63,702,873	8,413,876	13.208
1890.....	6,013,671	947,153	15.75	1909.....	52,493,863	6,814,754	12.982
1891.....	9,529,401	1,226,703	12.87	1910.....	55,692,369	7,094,094	12.738
1892.....	7,087,275	818,580	11.55	1911.....	55,648,011	6,886,998	12.376
1893.....	8,109,856	871,809	10.75	1912.....	77,832,127	12,718,548	16.341
1894.....	7,708,789	736,960	9.56	1913.....	76,976,925	11,753,606	15.269
1895.....	7,771,639	836,228	10.76	1914.....	75,735,960	10,301,606	13.602
1896.....	9,393,012	1,021,960	10.88	1915.....	100,785,150	17,410,635	17.275
1897.....	13,300,802	1,501,660	11.29	1916.....	117,150,028	31,867,150	27.202
1898.....	17,747,136	2,134,980	12.03	1917.....	109,227,332	29,687,989	27.180
1899.....	15,078,475	2,655,319	17.61	1918.....	118,769,434	29,250,536	24.628
1900.....	18,937,138	3,065,922	16.19	1919.....	75,053,581	14,028,265	18.691
1901.....	37,827,019	6,096,581	16.117	1920.....	81,600,691	14,244,217	17.456
1902.....	38,804,259	4,511,383	11.626	1921.....	47,620,820	5,953,555	12.502
1903.....	42,684,454	5,649,487	13.235	1922.....	42,879,818	5,738,177	13.382
1904.....	41,383,722	5,306,635	12.823				

PRODUCTION OF COPPER IN CANADA 1886-1922

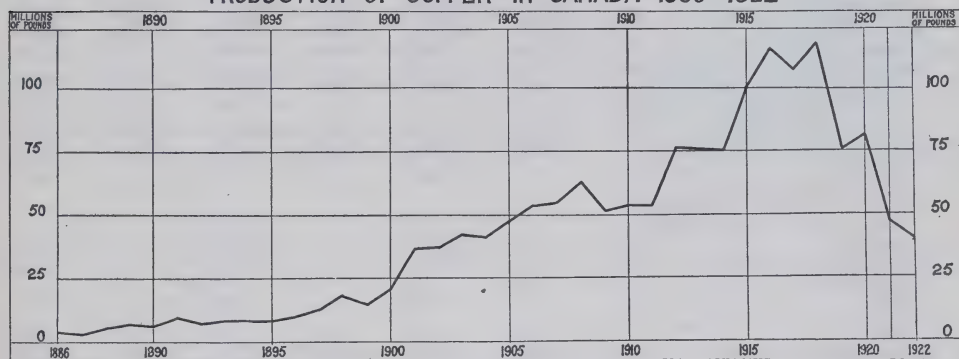


Table 33.—Production of Copper in Canada, by Provinces, 1920, 1921 and 1922

Province	1920			1921			1922		
	Pounds	Value	Per cent	Pounds	Value	Per cent	Pounds	Value	Per cent
		\$			\$			\$	
Quebec.....	880,638	153,724	1.1	352,308	44,045	0.8			
Ontario.....	32,059,993	5,596,392	39.3	12,821,385	1,602,930	26.9	10,943,636	1,464,477	25.5
Manitoba.....	3,062,577	534,604	3.8						
British Columbia.....	45,319,771	7,911,019	55.5	34,447,127	4,306,580	72.3	31,936,182	4,273,700	74.5
Yukon.....	277,712	48,478	0.3						
Total.....	81,600,691	14,244,217	100.0	47,620,820	5,953,555	100.0	42,879,818	5,738,177	100.0

Exports and Imports.—The value of the imports into Canada of copper and copper products during the calendar year 1922 was \$5,284,825 as against \$3,956,382 in 1921. Both years showed a marked decline from the figures for 1920 when the imports of these commodities were valued at \$10,744,117. This great recession in total values was due in part to the drop in copper prices and partly to the lessened demand reflected by decreases in quantities of the commodities entered. The decreases in the percentages of dutiable and free articles imported were about the same; for example the imports of copper in blocks, pigs or ingots which are dutiable were about 30 per cent lower in quantity in 1922 than in 1920, and the imports of old and scrap metal which are free also declined between 40 and 50 per cent during the same years.

In exports the values for the year 1922 showed a decrease in blister copper from previous years, but the 32,031,300 pounds given as exported was over 70 per cent of the total copper produced in Canada. The United States is by far the most important customer of Canada; nearly all the blister copper shown as exported is shipped to that country for refining. Large quantities of Canadian ore are also treated in the United States.

Table 34.—Imports into Canada and Exports of Copper, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
IMPORTS—						
Copper, in bars or rods, when imported by manufacturers of trolley, telegraph and telephone wires, electric wires and electric cables, for use only in the manufacture of such articles in their own factories.....	33,003,800	6,190,637	16,478,500	2,278,883	23,403,100	3,334,793
Copper, in bars or rods, in coil or otherwise, in lengths of not less than 6 feet, unmanufactured.....	903,500	218,080	789,400	140,422	445,900	80,701
Copper in blocks, pigs or ingots.....	9,236,575	1,784,370	925,452	135,563	1,145,463	159,671
Copper, old and scrap.....	2,481,100	404,161	307,900	37,955	1,470,900	205,447
Copper ore and concentrates.....	2,440,000	57,640	2,750,000	48,015	200	121
Copper, in strips, sheets or plates, not polished, planished or coated.....	1,716,300	550,769	1,833,800	426,854	2,293,800	497,013
Copper tubing in lengths of not less than 6 feet, and not polished, bent or otherwise manufactured.....	723,625	276,712	788,079	196,907	898,976	212,061
Copper wire, plain, tinned or plated.....	461,609	169,820	109,739	37,767	102,475	26,331
Copper wire cloth, or woven wire of copper.....		21,962		9,930		13,510
Copper wire, single or several, covered with cotton, linen, silk, rubber or other material, including cable so covered.....		205,189		195,453		232,872
Copper, all other manufactures of, n.o.p.....		662,806		316,944		351,694
Copper, precipitate of, crude.....	18	13	375	74	450	25
Anodes of nickel, zinc, copper, silver or gold.....		7,911		4,164		2,757
Copper, sub-acetate of, or verdigris, dry.....	3,657	1,147	256	92	988	326
Copper, sulphate of (blue vitriol).....	2,365,535	192,900	1,929,256	127,359	3,097,450	167,503
Total.....		10,744,117		3,956,382		5,284,825
EXPORTS—						
Copper, fine, contained in ore, matte, regulus, etc.....	47,329,700	5,918,782	10,511,500	1,029,220	19,063,100	1,730,681
Copper, blister.....	38,198,900	8,701,184	33,078,700	5,167,915	32,031,300	4,204,136
Copper, old and scrap.....	774,400	113,265	1,571,100	161,378	3,324,000	334,673
Copper, pig.....			2,678,200	355,693		
Copper in bars, rods, strips, sheets, plates and tubing.....	2,666,500	710,978	575,400	141,690	6,800	1,247
Copper wire and cable.....		433,097		569,648		208,683
Copper mfrs., n.o.p.....				30,250		53,569
Total.....		15,877,306		7,455,794		6,532,989

Prices.—Trade conditions were severely affected by the decrease in prices during the last quarter of 1920. In 1921 the average price for the twelve months was 12.502 cents with markets inactive. The year 1922 saw little improvement and the slight increase in the price to an average of 13.382 cents per pound for the period, was not sufficient to enable producers to reopen their idle properties on a normal scale.

Table 35.—Monthly Average Prices of Copper, New York and London, 1920, 1921 and 1922

(From the Engineering and Mining Journal-Press.)

Months	Electrolytic Copper					
	New York in cents per pound			London, £ Sterling per ton of 2,240 pounds		
	1920	1921	1922	1920	1921	1922
January.....	18.918	12.597	13.465	123.238	79.119	72.321
February.....	18.569	12.556	12.864	126.950	75.925	66.125
March.....	18.331	11.976	12.567	118.348	71.190	65.739
April.....	18.660	12.438	12.573	111.500	71.786	64.028
May.....	18.484	12.742	13.111	109.200	74.298	66.554
June.....	18.065	12.697	13.575	101.909	75.682	69.333
July.....	18.576	12.170	13.654	106.455	75.286	70.321
August.....	18.346	11.634	13.723	111.143	72.705	69.932
September.....	18.144	11.948	13.748	111.905	72.295	70.917
October.....	15.934	12.673	13.632	104.905	73.476	70.693
November.....	14.257	13.035	13.598	94.614	74.386	70.216
December.....	13.188	13.555	14.074	85.905	74.525	70.132
Average.....	17.456	12.502	13.382	108.839	74.223	68.859

QUEBEC

In 1922, for the first time in thirty-seven years, there was no production of copper from Quebec mines, all the mines in the eastern townships having been closed down. The major portion of the copper-pyrite ores from these properties was formerly treated in Canada for the sulphur contained, but important shipments carrying gold and silver were also exported for treatment in the copper smelters of the eastern United States.

Table 36.—Production of Copper in Quebec, 1886-1922

Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
		\$			\$			\$
1886.....	3,340,000	367,400	1900.....	2,220,000	359,418	1914.....	4,201,497	571,488
1887.....	2,937,900	330,514	1901.....	1,527,442	246,178	1915.....	4,197,482	725,115
1888.....	5,562,864	927,107	1902.....	1,640,000	190,666	1916.....	5,703,347	1,551,424
1889.....	5,315,000	730,813	1903.....	1,152,000	152,467	1917.....	5,015,560	1,363,229
1890.....	4,710,606	741,920	1904.....	760,000	97,455	1918.....	5,869,649	1,445,577
1891.....	5,401,704	695,469	1905.....	1,621,243	252,752	1919.....	2,691,695	503,105
1892.....	4,883,480	564,042	1906.....	1,981,169	381,930	1920.....	880,638	153,724
1893.....	4,468,352	480,348	1907.....	1,517,990	303,659	1921.....	352,308	44,045
1894.....	2,176,430	208,067	1908.....	1,282,024	169,330	1922.....		
1895.....	2,242,462	241,288	1909.....	1,088,212	141,272			
1896.....	2,407,200	261,903	1910.....	877,347	111,757			
1897.....	2,474,970	279,424	1911.....	2,436,190	301,503			
1898.....	2,100,235	252,658	1912.....	3,282,210	536,346			
1899.....	1,632,560	287,494	1913.....	3,455,887	527,679			
						Total.....	103,407,653	16,498,566

ONTARIO

Most of the copper produced in Ontario is closely allied to the production of nickel and is derived principally from the nickel ores of the Sudbury district. A few tons are also recovered in residues from the treatment of silver-cobalt ores. The decline in the markets for nickel which was recorded during 1921 still obtained during the period under review and the production of copper in Ontario consequently did not register any again. During 1922 the production from this province amounted to 10,943,636 pounds valued at \$1,464,477 as against 12,821,385 pounds valued at \$1,602,930 in 1921. Detailed statistics for copper from the nickel-copper ores are given under the section on nickel.

Table 37.—Production of Copper in Ontario, 1886-1922

Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
		\$			\$			\$
1886.....	165,000	18,150	1900.....	6,740,058	1,091,215	1914.....	28,948,211	3,937,536
1887.....	322,524	36,284	1901.....	8,695,831	1,401,507	1915.....	39,361,464	6,799,693
1888.....			1902.....	7,408,202	861,278	1916.....	44,997,035	12,240,094
1889.....	1,466,752	201,678	1903.....	7,172,533	949,285	1917.....	42,867,774	11,651,461
1890.....	1,303,065	205,233	1904.....	4,913,594	630,070	1918.....	47,074,475	11,593,502
1891.....	4,127,697	531,234	1905.....	8,779,259	1,368,686	1919.....	24,346,623	4,550,627
1892.....	2,203,795	254,538	1906.....	10,638,231	2,050,838	1920.....	32,059,993	5,596,392
1893.....	3,641,504	391,461	1907.....	14,104,337	2,821,432	1921.....	12,821,385	1,602,930
1894.....	5,207,679	497,854	1908.....	15,005,171	1,981,883	1922.....	10,943,636	1,464,477
1895.....	4,576,337	492,414	1909.....	15,746,699	2,044,237			
1896.....	3,167,256	344,598	1910.....	19,259,016	2,453,213			
1897.....	5,500,652	621,023	1911.....	17,932,263	2,219,297			
1898.....	8,375,223	1,007,539	1912.....	22,250,601	3,635,971			
1899.....	5,723,324	1,007,877	1913.....	25,885,929	3,952,522			
						Total.....	513,733,128	92,508,029

The bounty offered by the Ontario Government on copper, 95 per cent pure and on copper sulphate produced from ore mined and refined in the province was never gained, and the act known as the "Metal Refining Bounty Act" warranting this bounty which expired April 10, 1917, was not re-enacted.

MANITOBA

During the years 1917 to 1920 the province of Manitoba was on record as one of the copper-producing provinces in Canada. The total production for the four years amounted to 9,866,328 pounds having a total value of \$2,039,942. The record was as follows—1917—1,116,000 pounds, valued at \$303,329; 1918—2,339,751 pounds valued at \$576,234; 1919—3,348,000 pounds valued at \$625,775 and 1920—3,062,577 pounds valued at \$534,604. These amounts were estimated as the copper recovered from ores shipped by the Mandy Mining Company operating near Schist Lake in The Pas district of Northern Manitoba. During 1921 and 1922, with increasing production costs, high freight rates and other transportation difficulties it was found impossible to operate and no copper ores were shipped.

Much development has been carried on in this district during the past seven years. Towards the end of 1919 the Mandy Mining Company suspended operations, and has since sold its equipment, which has been installed on the Flin Flon group of claims on Flin Flon Lake in the same district.

BRITISH COLUMBIA

The production of copper from British Columbia ores in 1922 amounted to 31,936,182 pounds, valued at \$4,273,700 as against 34,447,127 pounds valued at \$4,306,580 in 1921, a decrease of 7.2 per cent in quantity and 0.7 per cent in value. The British Columbia output amounted to 74.5 per cent of the total production in Canada for 1922 and 72.3 per cent of the total for 1921.

This production included the copper content of the blister copper produced, which was partly refined at Trail and partly exported for refining in the United States; the copper equivalent of the copper sulphate produced at Trail and the estimated recoveries of copper from ores and concentrates exported; but it did not include the copper derived from the treatment of foreign ores or from ores of other provinces which were treated in British Columbia smelters.

Table 38.—Production of Copper in British Columbia, 1894-1922

Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
		\$			\$			\$
1894*.....	324,680	31,039	1905*.....	37,692,251	5,876,222	1916.....	63,642,550	17,312,046
1895*.....	952,840	102,526	1906*.....	42,990,488	8,287,706	1917.....	57,730,959	15,691,275
1896*.....	3,818,556	415,459	1907*.....	40,832,720	8,163,177	1918.....	62,865,681	15,482,560
1897*.....	5,325,180	601,213	1908.....	37,041,115	4,892,390	1919.....	44,502,079	8,317,884
1898*.....	7,271,678	874,783	1909.....	35,658,952	4,629,245	1920.....	45,319,771	7,911,019
1899*.....	7,722,591	1,359,945	1910.....	35,270,006	4,492,693	1921.....	34,447,127	4,306,580
1900*.....	9,977,080	1,615,289	1911.....	35,279,558	4,366,198	1922.....	31,936,182	4,273,700
1901*.....	27,603,746	4,448,896	1912.....	50,526,656	8,256,561			
1902*.....	29,636,057	3,445,488	1913.....	45,791,579	6,991,916			
1903*.....	34,359,921	4,547,735	1914.....	41,219,202	5,606,636			
1904*.....	35,710,128	4,579,110	1915.....	56,692,988	9,793,714			
						Total.....	962,142,321	166,678,008

*Metal contents of ores shipped as published by the Provincial Bureau of Mines.

Copper mining is one of the most important sections of the industry in the province, and in 1922 it contributed about 18 per cent of the total value from the metalliferous mines. The slump in the price of copper in 1921 and the large amounts of copper metal held in stock, continued to act as deterrents to production in the copper mining industry throughout 1922 and many mines which operated in 1919 and 1920 were compelled to reduce their operations or close down entirely. The main production of copper in British Columbia has been drawn from the large low-grade copper deposits of the Pacific Coast and the Cassiar district, representative properties in which are the Hidden Creek Group of Granby Mining, Smelting and Power Company and the properties of the Britannia Mining and Smelting Company.

YUKON

There are important deposits of copper-bearing ore known to exist in the Yukon Territory, some of which were operated during the period from 1906 until 1920. Since the latter year, no production of copper has been reported, and the grand total for the Territory remains at 12,912,507 pounds, or a little greater than that of Manitoba.

Table 39.—Production of Copper in Yukon to 1922

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1906 (and previous).....	156,000	23,400	1914.....	1,367,050	185,946
1907.....	511,838	102,388	1915.....	533,216	92,113
1908.....	112,264	14,828	1916.....	2,807,096	763,586
1909.....			1917.....	2,460,079	668,650
1910.....	286,000	36,431	1918.....	619,878	152,663
1911.....			1919.....	165,184	30,874
1912.....	1,772,660	289,670	1920.....	277,712	48,478
1913.....	1,843,530	281,489	1921-1922.....		
			Total.....	12,912,507	2,690,516

Table 40.—World's Production of Copper * 1913, 1918-1922

(Compiled from the Year Book of the American Bureau of Metal Statistics.)
(Short tons)

Country	1913	1918	1919	1920	1921	1922
NORTH AMERICA—						
United States.....	614,255	968,687	604,642	635,248	238,420	511,970
Mexico.....	53,185	83,233	66,661	49,866	13,576	29,842
Canada.....	38,460	58,068	39,789	39,121	22,632	25,300
Cuba.....	3,747	13,595	10,991	7,491	8,600	11,788
Total, North America.....	714,647	1,123,583	722,083	731,726	283,228	578,900
SOUTH AMERICA—						
Bolivia.....	4,077	6,612	7,714	10,910	10,674	11,795
Chile.....	46,574	117,851	87,721	104,173	61,421	141,433
Peru.....	30,609	45,944	43,243	36,356	37,258	39,200
Total, South America.....	81,260	173,407	138,678	151,439	109,353	192,428
EUROPE—						
Austria-Hungary.....	4,518	2,755	713	1,747	4,600	4,630
Germany.....	27,881	16,641	17,384	19,015	20,944	18,739
Norway.....	3,021	3,147	482	613	1,486	2,205
Russia.....	37,358					2,205
Spain and Portugal.....	39,683	50,596	38,581	25,353	36,596	40,234
Sweden.....	4,645	4,172	4,442	1,793	1,268	
Serbia.....	7,053	6,612	1,332	2,694	4,376	5,756
Total, Europe.....	124,159	83,923	62,934	51,205	69,270	73,769
ASIA—						
Japan.....	73,283	99,583	86,468	74,727	59,626	60,365
Other Asia.....			1,098	593	933	992
Total Asia.....	73,283	99,583	87,566	75,320	60,559	61,357
AUSTRALIA.....	49,901	49,284	18,118	29,327	20,869	13,754
AFRICA.....	25,236	34,233	34,548	33,708	42,501	59,616
OTHER COUNTRIES.....	4,188	5,510	5,510	5,510	5,510	7,716
Grand Total.....	1,072,674	1,569,523	1,069,437	1,073,235	591,290	957,540

* So far as possible, these statistics are based on blister copper, referred to countries wherein ore are originated.

GOLD

CANADA

The production of gold from all sources in Canada during the calendar year 1922 amounted to 1,263,364 fine ounces, valued at \$26,116,050, or an increase of slightly over 36 per cent above the previous year, when 926,329 fine ounces, valued at \$19,148,920 was produced.

The 1922 output was the second greatest annual production ever recorded for Canada, being exceeded only by the total of 1,350,057 ounces produced in 1900. Ontario's production exceeded the million-ounce mark for the first time.

The production for 1922 was derived from (a) alluvial gold, 72,017 ounces; (b) gold obtained from milling ores 1,017,961 ounces; (c) gold obtained from ores treated at Canadian copper and lead smelters, 41,516 ounces; and (d) the estimated gold recoveries from ores and concentrates exported, 131,870 ounces. The corresponding figures for the year 1921 were: (a) 77,246 ounces. (b) 711,121 ounces, (c) 52,822 ounces, and (d) 85,140 ounces.

The production of gold by provinces was: Nova Scotia, 1,042 ounces or about 0.08 per cent of the total for Canada; Ontario, 1,000,340 ounces, or 79.2 per cent; Manitoba, 156 ounces, or 0.02 per cent; British Columbia, 207,370 ounces, or 16.4 per cent; and the Yukon Territory, 54,456 ounces or 4.3 per cent.

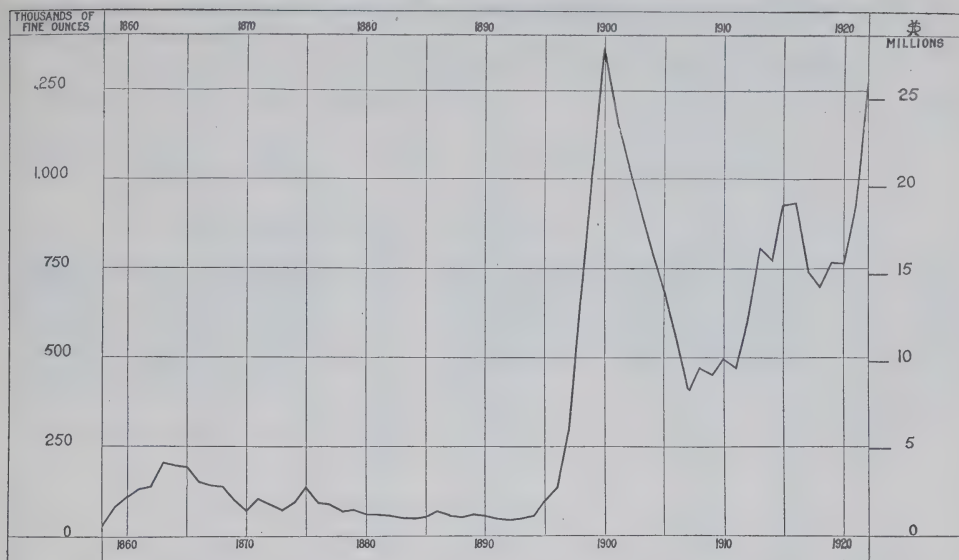
The large increase in the production of gold was due principally to the continued expansion of the operating gold mines in Ontario, the output from which exceeded the 1921 record by over 41.3 per cent. The output from British Columbia also increased by over 37 per cent, evidence of the recovery in gold mining which occurred in that province during the period. Nova Scotia's production increased from 439 to 1,042 fine ounces, while that of Yukon Territory and Manitoba decreased. Quebec for the first time since 1877 was not included as a producer of gold.

Table 41.—Production of Gold in Canada, 1858-1922

Year	Fine ounces*	Value	Year	Fine ounces*	Value	Year	Fine ounces*	Value
		\$			\$			\$
1858.....	34,104	705,000	1881.....	63,524	1,313,153	1904.....	796,374	16,462,517
1859.....	78,129	1,615,072	1882.....	60,288	1,246,268	1905.....	684,951	14,159,195
1860.....	107,806	2,228,543	1883.....	53,853	1,113,246	1906.....	556,415	11,502,120
1861.....	128,973	2,666,118	1884.....	51,202	1,058,439	1907.....	405,517	8,382,780
1862.....	135,391	2,798,774	1885.....	55,575	1,148,829	1908.....	476,112	9,842,105
1863.....	202,498	4,186,011	1886.....	70,782	1,463,196	1909.....	453,865	9,382,230
1864.....	199,605	4,126,199	1887.....	57,460	1,187,804	1910.....	493,707	10,205,835
1865.....	192,898	3,987,562	1888.....	53,145	1,098,610	1911.....	473,159	9,781,077
1866.....	152,555	3,153,597	1889.....	62,653	1,295,159	1912.....	611,885	12,648,794
1867.....	145,775	3,013,431	1890.....	55,620	1,149,776	1913.....	802,973	16,598,923
1868.....	134,169	2,773,527	1891.....	45,018	930,614	1914.....	773,178	15,983,007
1869.....	102,720	2,123,405	1892.....	43,905	907,601	1915.....	918,056	18,977,901
1870.....	83,415	1,724,348	1893.....	47,243	976,603	1916.....	930,492	19,234,976
1871.....	105,187	2,174,412	1894.....	54,600	1,128,688	1917.....	738,831	15,272,992
1872.....	90,283	1,866,321	1895.....	100,798	2,083,674	1918.....	699,681	14,463,689
1873.....	74,346	1,536,871	1896.....	133,262	2,754,774	1919.....	766,764	15,850,423
1874.....	97,856	2,022,862	1897.....	291,557	6,027,016	1920.....	765,007	15,814,098
1875.....	130,300	2,693,533	1898.....	666,386	13,775,420	1921.....	926,329	19,148,920
1876.....	97,729	2,020,233	1899.....	1,028,529	21,261,584	1922.....	1,263,364	26,116,050
1877.....	94,304	1,949,444	1900.....	1,350,057	27,908,153			
1878.....	74,420	1,538,394	1901.....	1,167,216	24,128,503			
1879.....	76,547	1,582,358	1902.....	1,032,161	21,336,667			
1880.....	63,121	1,304,824	1903.....	911,559	18,843,590			
						Total.....	23,595,184	487,755,838

*Calculated from the value: one dollar=0.048375 oz.

PRODUCTION OF GOLD IN CANADA 1858-1922.



Refined Metal.—There were two refineries producing fine gold in Canada, namely, the Royal Mint, Ottawa, Ont., and that of the Consolidated Mining and Smelting Company of Canada, Ltd., at Tadanac, near Trail, B.C. From all ores treated during 1922, the latter company produced 18,940 fine ounces of gold. This gold was recovered principally, from the gold and copper ores, but also from silver-lead, and dry ores. Small quantities of imported ores were also treated by this company.

Table 42.—Refined Gold Produced at Trail, B.C.*

Year	Fine oz.	Year	Fine oz.
1904.....	4,336	1913.....	11,977
1905.....	8,602	1914.....	11,088
1906.....	9,993	1915.....	17,813
1907.....	10,395	1916.....	23,608
1908.....	15,346	1917.....	49,661
1909.....	18,241	1918.....	61,212
1910.....	13,298	1919.....	47,283
1911.....	15,270	1920.....	42,636
1912.....	12,118	1921.....	56,297
		1922.....	18,940

*Includes some gold derived from imported ores and from occasional shipments from Ontario, Manitoba, Alberta, and the Yukon.

Table 43.—Receipts of Gold Bullion at the Royal Mint, Ottawa, Ont.

Year	From Canadian Sources		From Foreign Countries	
	Oz. Gross	Value Gold Contents	Oz. Gross	Value Gold Contents
		\$		\$
1908.....	219-19	3,823 03		
1909.....	5,741-43	94,864 81	38-25	673 98
1910.....	65,009-35	1,079,223 42		
1911.....	89,463-11	1,469,087 43	511-24	9,128 55
1912.....	104,825-29	1,676,371 78	742-79	12,451 33
1913.....	212,076-41	3,363,870 30	633-23	11,609 84
1914.....	29,762-24	471,042 90	4,750-19	98,062 84
1915.....	89,231-47	1,402,605 19	871,693-79	15,838,222 01
1916.....	49,195-39	780,074 19	6,687,758-41	121,513,083 93
1917.....	55,779-96	840,265 33	8,196,151-04	148,919,793 48
1918.....	302,785-96	4,982,743 81	3,728,224-05	67,739,887 68
1919.....	654,906-28	10,865,770 57	8,917-02	134,756 38
1920.....	724,083-34	11,530,413 82		
1921.....	1,054,277-01	16,914,211 58	53-00	826 87
1922.....	1,376,863-35	22,469,160 42	345-22	5,387 93

In addition to the above, the Mines Branch of the Department of Mines operated the Vancouver Assay Office where crude bullion, nuggets and dust, were bought, melted, and sold.

Table 44.—Receipts at Dominion Assay Office, Vancouver, B.C.

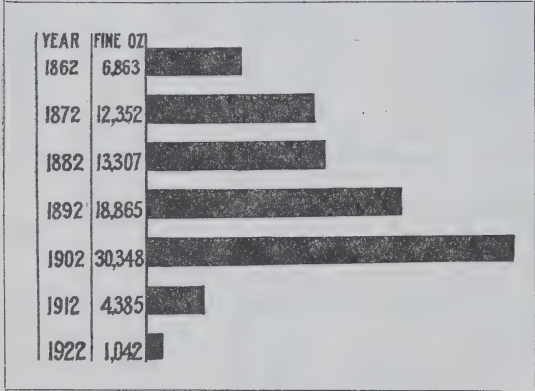
Year	Weight before melting	Weight after melting	Net Value	Year	Weight before melting	Weight after melting	Net Value
	ounces	ounces	\$		ounces	ounces	\$
1908 (a).....	90,175.48	89,117.76	1,478,894 00	1915.....	183,924.49	179,751.68	2,736,302 31
1909.....	48,478.58	47,576.27	789,267 94	1916.....	180,292.83	175,393.10	2,828,239 65
1910.....	46,064.31	45,228.92	746,101 92	1917.....	191,626.04	187,884.48	3,257,220 71
1911.....	39,784.70	39,069.31	647,416.38	1918.....	241,762.77	238,245.07	4,099,595 80
1912.....	59,068.82	57,951.98	974,077 14	1919.....	209,026.14	205,947.57	3,547,524 93
1913 (b).....	111,479.94	109,920.49	1,448,625 37	1920.....	150,869.17	147,718.25	2,499,174 41
1914.....	166,148.83	163,523.61	2,029,251 31	1921.....	163,070.56	160,803.48	2,834,499 61
				1922.....	129,891.63	125,758.41	2,105,989 64

(a) For 9 months only. (b) The removal of the assay charge in January 1913, accounts for the large increase.

Table 45.—Imports of Gold into Canada, 1920, 1921 and 1922

Item	1920	1921	1922
	\$	\$	\$
Gold—			
Fringe.....	36,919	62,519	38,939
Manufactures of Gold and Silver—			
Leaf.....	108,788	47,123	63,276
Sweepings.....	6,605	2,771	5,471
Manufactures, n.o.p.....	184,681	97,110	89,684
Electroplated ware.....	545,015	387,974	442,593

PRODUCTION OF GOLD IN NOVA SCOTIA, 1862-1922



NOVA SCOTIA

The gold production in Nova Scotia has been derived almost entirely from quartz ores and in 1922 it amounted to 1,042 fine ounces valued at \$21,540 as against 439 fine ounces valued at \$9,075, in 1921.

The most prosperous year in the history of gold mining in Nova Scotia was 1902 when 30,348 fine ounces was recovered. The production then gradually decreased, and the falling-off is attributed partly to the exhaustion of the mines and partly to the high

cost of supplies and labour. Several small custom gold mills were formerly operated in this province but during 1922 only one such mill reported any operations.

Table 46.—Production of Gold in Nova Scotia, 1862-1922

Year	Tons treated	Fine ounces	Value	Yield of gold per ton	Year	Tons treated	Fine ounces	Value	Yield of gold per ton
			\$	\$				\$	\$
1862.....	6,473	6,863	141,871	21 91	1894.....	55,357	18,834	389,338	7 04
1863.....	17,000	13,180	272,448	16 02	1895.....	60,600	21,919	453,119	7 47
1864.....	21,431	18,883	390,349	18 21	1896.....	69,169	23,876	493,568	7 13
1865.....	24,421	24,011	496,357	20 32	1897.....	73,192	27,195	562,165	7 68
1866.....	32,157	23,776	491,491	15 28	1898.....	82,747	26,054	538,590	6 50
1867.....	31,384	25,763	532,563	16 96	1899.....	112,226	29,876	617,604	5 50
1868.....	32,259	19,377	400,555	12 41	1900.....	87,390	28,955	598,553	6 85
1869.....	35,144	16,855	348,427	19 91	1901.....	91,948	26,459	546,963	5 32
1870.....	30,824	18,740	387,392	12 56	1902.....	93,042	30,348	627,357	6 68
1871.....	30,787	18,139	374,972	12 17	1903.....	103,856	25,533	527,806	5 08
1872.....	17,089	12,352	255,349	14 94	1904.....	45,436	10,362	214,209	4 71
1873.....	17,708	11,180	231,122	13 05	1905.....	57,774	13,707	283,353	4 90
1874.....	13,844	8,623	178,244	12 87	1906.....	66,059	12,223	252,676	3 82
1875.....	14,810	10,576	218,629	14 76	1907.....	58,550	13,675	282,686	4 82
1876.....	15,490	11,300	233,585	15 08	1908.....	61,536	11,842	244,799	3 97
1877.....	17,369	15,925	329,205	18 95	1909.....	56,790	10,193	210,711	3 71
1878.....	17,989	11,864	245,253	13 63	1910.....	43,006	7,928	163,891	3 81
1879.....	15,936	12,980	268,328	16 83	1911.....	18,328	7,781	160,854	8 78
1880.....	13,997	12,472	257,823	18 42	1912.....	14,360	4,385	90,638	6 51
1881.....	16,556	10,147	209,755	12 66	1913.....	7,324	2,174	44,935	6 13
1882.....	21,081	13,307	275,090	13 04	1914.....	13,156	2,904	60,031	4 56
1883.....	25,954	14,571	301,207	11 60	1915.....	25,204	6,636	137,180	5 44
1884.....	25,186	15,168	313,554	12 44	1916.....	17,497	4,562	94,305	5 38
1885.....	28,890	20,945	432,971	14 98	1917.....	5,916	2,210	45,685	7 72
1886.....	29,010	22,038	455,564	15 70	1918.....	1,630	1,176	24,310	14 91
1887.....	32,280	20,009	413,631	12 81	1919.....	1,362	850	17,571	12 90
1888.....	36,178	21,137	436,939	12 08	1920.....	858	690	14,263	16 62
1889.....	39,160	24,673	510,029	13 02	1921.....	626	*418	8,641	13 80
1890.....	42,749	22,978	474,990	11 11	1922.....	6,142	1,042	21,540	3 50
1891.....	36,351	21,841	451,503	12 42					
1892.....	32,552	18,865	389,965	11 98					
1893.....	42,354	18,436	381,095	8 99					
Total.....						2,145,494	910,781	18,827,597	8 58

*439 fine ounces reported as received by Royal Mint from Nova Scotia, 21 of which came from old ore dumps.

PRODUCTION OF GOLD IN QUEBEC, 1877-1922

YEAR	FINE OZ
1877	583
1882	827
1892	628
1902	391
1912	642
1922	NIL

QUEBEC

The production of gold in the province of Quebec, which was first recorded in the year 1877 had, by the end of 1921, reached a grand total of 26,834 fine ounces, valued at \$534,671. Due to the inactivity of the zinc-lead mines in Portneuf county and the copper-pyrite mines of the eastern townships throughout the whole of 1922, no production was recorded for that year. Towards the end of the year however, important discoveries of gold were reported in Rouyn

township in the northwestern part of the province and due east of the important gold fields in Teck and Lebel townships in Ontario. No alluvial gold production has been reported for a number of years.

Table 47.—Production of Gold in Quebec, 1877-1922

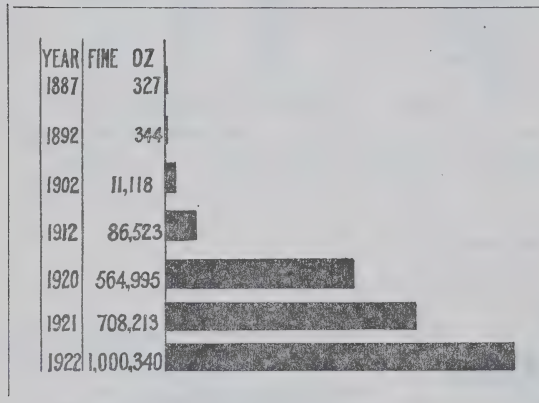
Year	Fine ounces*	Value	Year	Fine ounces*	Value	Year	Fine ounces*	Value
		\$			\$			\$
1877.....	583	12,057	1884.....	1,412	29,196	1911.....	613	12,672
1878.....	868	17,937	1885.....	62	1,281	1912.....	642	13,270
1879.....	1,160	23,972	1886.....	145	3,000	1913.....	701	14,491
1880.....	1,605	33,174	1887.....	44	900	1914.....	1,292	26,708
1881.....	2,741	56,661	1888.....	295	6,089	1915.....	1,099	22,720
1882.....	827	17,093	1889.....	238	4,916	1916.....	1,034	21,375
1883.....	860	17,787	1900.....			1917.....	1,511	31,235
1884.....	422	8,720	1901.....	145	3,000	1918.....	1,939	40,083
1885.....	103	2,120	1902.....	391	8,073	1919.....	1,470	30,388
1886.....	193	3,981	1903.....	180	3,712	1920.....	955	19,742
1887.....	78	1,604	1904.....	140	2,900	1921.....	635	13,127
1888.....	181	3,740	1905.....	191	3,940	1922.....		
1889.....	58	1,207	1906.....	165	3,412			
1890.....	65	1,350	1907.....					
1891.....	87	1,800	1908.....					
1892.....	628	12,987	1909.....	193	3,990			
1893.....	759	15,696	1910.....	124	2,565	Total.....	26,834	554,671

*Calculated from the value: one dollar = 0.048375 ounce.

ONTARIO

The gold production of Ontario in 1922 amounted to 1,000,340 fine ounces valued at \$20,678,862 as against 708,213 fine ounces valued at \$14,640,062 in 1921 showing an increase of more than 41 per cent.

PRODUCTION OF GOLD IN ONTARIO, 1887-1922



Since 1914 Ontario has become by far the largest producer of gold in Canada and this remarkable increase was brought about by the successful development of the Porcupine and Kirkland Lake districts and by the extension of milling facilities in these camps. The falling-off in production during 1917 and 1918 was due to the abnormal conditions created by the war. The production increased rapidly through the three following years and in 1922 was the greatest ever recorded. All gold being paid for in New York funds, the exchange premium paid by the Royal Mint proved an important feature of gold-marketing and while it was of importance from the close of

the war until the end of 1921, the gradual recovery in the value of the Canadian dollar in the United States exchanges has greatly decreased the premiums made by Canadian mines. While in 1920 the United States dollar had an average exchange value in Canadian funds of \$1.12270, the average exchange value in 1922 was \$1.0145, or nearly par.

Table 48.—Production of Gold in Ontario, 1887-1922

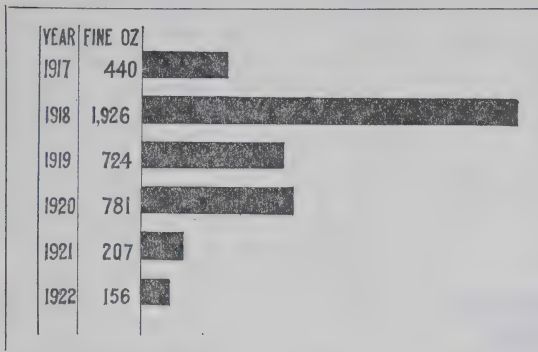
Year	Fine ounces†	Value	Year	Fine ounces†	Value	Year	Fine ounces†	Value
		\$			\$			\$
1887.....	327	6,760	1900.....	14,391	297,495	1913.....	219,801	4,543,690
1888.....			1901.....	11,844	244,837	1914.....	268,264	5,545,509
1889.....			1902.....	11,118	229,828	1915.....	406,577	8,404,693
1890.....			1903.....	9,096	188,036	1916.....	492,481	10,180,485
1891.....	97	2,000	1904.....	1,935	40,000	1917.....	423,261	8,749,581
1892.....	344	7,118	1905.....	4,402	91,000	1918.....	411,976	8,516,299
1893.....	708	14,637	1906.....	3,202	66,193	1919.....	505,739	10,454,553
1894.....	1,917	39,624	1907.....	3,212	66,398	1920.....	564,995	11,679,483
1895.....	3,015	62,320	1908.....	3,212	66,398	1921.....	708,213	14,640,062
1896.....	5,563	115,000	1909.....	1,569	32,425	1922.....	1,000,340	20,678,862
1897.....	9,157	189,294	1910.....	3,089	63,849			
1898.....	12,863	265,889	1911.....	2,062	42,625			
1899.....	20,394	421,591	1912.....	86,523	1,785,596	Total.....	5,211,687	107,735,130

†Calculated from the value: one dollar = 0.048375 ounce.

MANITOBA

The gold production in Manitoba during 1922 amounted to 156 fine ounces, valued at \$3,225, as against 207 fine ounces valued at \$4,279 in 1921; 781 fine ounces valued at \$16,145, in 1920; 724 ounces, valued at \$14,966, in 1919; 1,926 ounces, valued at \$39,814, in 1918; and 440 ounces, valued at \$9,095, in 1917. There was no production recorded prior to 1917.

PRODUCTION OF GOLD IN MANITOBA, 1917-1922



Late in 1921 interesting finds were reported from the Elbow Lake district north of The Pas and many claims were staked. Operations were also carried on east of Lake Winnipeg in the Managotogan district. A report on the geology and mineral resources of the Rice Lake and Oiseau River areas of Manitoba was published by the Geological Survey during the year

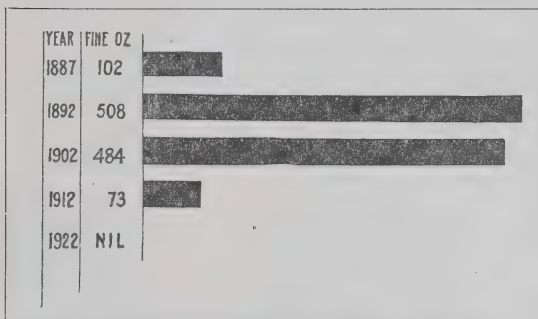
SASKATCHEWAN

In the autumn of 1913 considerable interest was created in the reported gold discoveries at Beaver Lake (Amisk Lake). A number of prospectors went in with the opening of navigation. A good deal of prospecting was done during 1914, and some further work in 1915, but as yet no production has been reported.

ALBERTA

Small quantities of gold have been occasionally recovered in Alberta by prospectors, from the gravels of the Saskatchewan River; these are sold through the banks at Edmonton. During 1922, a few small lots found their way into commerce in this manner but reports indicated that the recoveries were made in British Columbia along the Peace River. No production, therefore, may be credited to Alberta for the year 1922. To date, the grand total of gold produced by this province amounted to 15,109 fine ounces and was valued at \$312,333.

PRODUCTION OF GOLD IN ALBERTA, 1887-1922



During 1922, a few small lots found their way into commerce in this manner but reports indicated that the recoveries were made in British Columbia along the Peace River. No production, therefore, may be credited to Alberta for the year 1922. To date, the grand total of gold produced by this province amounted to 15,109 fine ounces and was valued at \$312,333.

Table 49.—Production of Gold in Alberta, 1887-1922

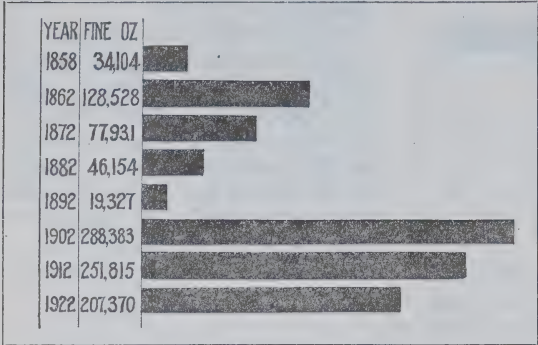
Year	Fine ounces†	Value	Year	Fine ounces†	Value	Year	Fine ounces†	Value
1887	102	\$ 2,100	1900	242	5,000	1913		
1888	58	1,200	1901	726	15,000	1914	48	992
1889	967	20,000	1902	484	10,000	1915	195	4,026
1890	193	4,000	1903	48	1,000	1916	82	1,695
1891	266	5,500	1904	24	500	1917		
1892	508	10,506	1905	121	2,500	1918	27	558
1893	466	9,640	1906	39	800	1919	24	500
1894	726	15,000	1907	33	675	1920		
1895	2,419	50,000	1908	50	1,037	1921	49	1,013
1896	2,661	55,000	1909	25	525	1922		
1897	2,419	50,000	1910	89	1,850			
1898	1,209	25,000	1911	10	207			
1899	726	15,000	1912	73	1,509			
						Total	15,109	312,333

†Calculated from the value: one dollar=0.048375 ounce.

BRITISH COLUMBIA

The increased production of gold in British Columbia was accounted for by the greater activity in placer mining, the re-opening of some former producing mines which were idle in 1921, and the considerable increase in the gold contents of ores exported to the United States. These increases more than offset the decrease in the gold recovered from smelter products. The production in 1922 amounted to 207,370 fine ounces, valued at \$4,286,718 as against 150,792 fine ounces valued at \$3,117,147 in 1921, or an increase of 37.5 per cent. The production from this province amounted to 16.41 per cent of the total for Canada.

PRODUCTION OF GOLD IN BRITISH COLUMBIA,
1858-1922



ounces or 63.2 per cent. The corresponding quantities for 1921 were (a) 11,281 fine ounces or 7.5 per cent (b) 3,311 fine ounces or 2.2 per cent (c) 52,643 fine ounces or 34.9 per cent and (d) 83,557 fine ounces or 55.4 per cent.

The amounts shown for alluvial gold are as published by the Provincial Mineralogist, while those from milling ores, smelter recoveries and ores exported have been compiled from reports received from smelters and mine operators. The re-opening of the Nickel Plate mine of the Hedley Gold Mining Company, and the richness of the ores shipped from the Premier mine were important factors in the rise in gold production.

Table 50.—Production of Gold in British Columbia, 1858-1922

Year	Fine ounces‡	Value	Year	Fine ounces‡	Value	Year	Fine ounces‡	Value
		\$			\$			\$
1858.....	34,104	705,000	1880.....	49,044	1,013,827	1902.....	288,383	5,961,409
1859.....	78,129	1,615,072	1881.....	50,636	1,046,737	1903.....	284,108	5,873,036
1860.....	107,806	2,228,543	1882.....	46,154	954,085	1904.....	275,975	5,704,908
1861.....	128,973	2,666,118	1883.....	38,422	794,252	1905.....	285,529	5,902,402
1862.....	128,528	2,656,903	1884.....	35,612	736,165	1906.....	269,886	5,579,039
1863.....	189,318	3,913,563	1885.....	34,527	713,738	1907.....	236,216	4,883,020
1864.....	180,722	3,735,850	1886.....	43,714	903,651	1908.....	286,858	5,929,880
1865.....	168,887	3,491,205	1887.....	33,558	693,709	1909.....	250,320	5,174,579
1866.....	128,779	2,662,106	1888.....	29,834	616,731	1910.....	261,386	5,403,318
1867.....	120,012	2,480,868	1889.....	28,489	588,923	1911.....	238,496	4,930,145
1868.....	114,792	2,372,972	1890.....	23,918	494,436	1912.....	251,815	5,205,485
1869.....	85,865	1,774,978	1891.....	20,792	429,811	1913.....	297,459	6,149,027
1870.....	64,675	1,336,956	1892.....	19,327	399,525	1914.....	252,730	5,224,393
1871.....	87,048	1,799,440	1893.....	18,360	379,535	1915.....	273,376	5,651,184
1872.....	77,931	1,610,972	1894.....	25,664	530,530	1916.....	219,633	4,540,216
1873.....	63,166	1,305,749	1895.....	61,289	1,266,954	1917.....	133,742	2,764,693
1874.....	89,233	1,844,618	1896.....	86,504	1,788,206	1918.....	180,163	3,724,300
1875.....	119,724	2,474,904	1897.....	131,805	2,724,657	1919.....	167,252	3,457,406
1876.....	86,429	1,786,648	1898.....	142,215	2,939,852	1920.....	124,808	2,580,010
1877.....	77,796	1,608,182	1899.....	203,295	4,202,473	1921.....	150,792	3,117,147
1878.....	61,688	1,275,204	1900.....	228,916	4,732,105	1922.....	207,370	4,286,718
1879.....	62,407	1,290,058	1901.....	257,292	5,318,703			
						Total.....	8,801,676	181,946,829

‡Calculated from the value: one dollar=0.48375 ounces

The statistics reported by the Provincial Bureau of Mines covering the 1921 and 1922 production follow. The quantities given for lode gold production, which are based on the metal contents of ores shipped, are as a rule, somewhat higher than the record of smelter recoveries.

Table 51.—Production of Gold in British Columbia by Districts, 1921 and 1922

(From Annual Report of the Minister of Mines for British Columbia.)

Districts	1921				1922			
	Gold Placer		Gold Lode		Gold Placer		Gold Lode	
	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value
Cariboo:—		\$		\$		\$		\$
Cariboo and Quesnel.....	3,370	67,400			9,615	192,300		
Omineca.....	159	3,000	13	269	275	5,500	66	1,364
Cassiar:—								
Atlin, Liard and Stikine.....	7,210	144,200	3	62	7,450	149,000	3	62
Skeena, etc.....	100	2,000	85,182	1,760,713			167,733	3,467,041
East Kootenay:—								
Fort Steele.....	180	3,600	1	20	150	3,000		
Windermere and Golden.....								
West Kootenay:—								
Ainsworth.....			11	227			25	517
Nelson.....	50	1,000	3,587	74,143			2,392	49,443
Slocan and Slocan City.....			19	393			224	4,630
Trail Creek.....			44,980	929,737			8,256	170,651
Revelstoke, etc.....	50	1,000	8	165	50	1,000	4	83
Yale:—								
Grand Forks, Greenwood and Osoyoos.....	25	500	735	15,192	25	500	17,918	370,365
Similkameen, Nicola and Vernon.....	50	1,000			225	4,500	433	8,950
Yale, Ashcroft and Kamloops.....	50	1,000			150	3,000	364	7,524
Lillooet:—								
Lillooet.....	400	8,000	374	7,730	275	5,500	373	7,710
Southern Coast:—								
Vancouver Island.....	25	500	104	2,150	25	500	65	1,344
Mainland.....			646	13,353				
Total.....	11,660	233,200	135,663	2,894,154	18,240	364,800	197,856	4,089,684

YUKON

The gold production from the Yukon in 1922 was derived from the alluvial sands of the Dawson and Whitehorse districts and showed a slight decrease from the quantity reported in the previous year. The output for 1922 was 54,456 fine ounces, valued at \$1,125,705 which included 54,370 ounces from alluvial sands and 86 ounces from lead ores shipped to United States smelters, as against 65,994 fine ounces, valued at \$1,364,217 in 1921. Of the 1921 production 78 ounces was recovered from lode mine shipments.

Bounty was paid on 67,961 crude ounces which included 54,370 fine ounces of gold valued at \$1,123,927 and 12,233 fine ounces of silver valued at \$8,259, a total value of \$1,132,186.

For 1921 the corresponding figures were 82,394 crude ounces, containing 65,916 fine ounces of gold, valued at \$1,362,604, and 14,831 fine ounces of silver valued at \$9,292 or a total value of \$1,363,534.

PRODUCTION OF GOLD IN YUKON, 1885-1922

YEAR	FINE OZ
1885	4,837
1892	4,233
1902	701,437
1912	268,447
1922	54,456

The following table shows statistics of gold produced in the Yukon during the past 37 years. Between the years 1898 and 1906 the figures were based upon receipts of gold at the United States mints and receiving offices, credited to the Canadian Yukon.

Table 52.—Production of Gold in the Yukon, 1885-1922

Year	Fine Ounces†	Value	Year	Fine Ounces†	Value	Year	Fine Ounces†	Value
		\$			\$			\$
1885)			1899.....	774,000	16,000,000	1913.....	282,838	5,846,780
1886).....	4,837	100,000	1900.....	1,077,553	22,275,000	1914.....	247,940	5,125,374
1887.....	3,386	70,000	1901.....	870,750	18,000,000	1915.....	230,173	4,758,098
1888.....	1,935	40,000	1902.....	701,437	14,500,000	1916.....	212,700	4,396,900
1889.....	8,466	175,000	1903.....	592,594	12,250,000	1917.....	177,667	3,672,703
1890.....	8,466	175,000	1904.....	507,938	10,500,000	1918.....	102,474	2,118,325
1891.....	1,953	40,000	1905.....	381,001	7,876,000	1919.....	90,705	1,875,039
1892.....	4,233	87,500	1906.....	270,900	5,600,000	1920.....	72,778	1,504,455
1893.....	8,514	176,000	1907.....	152,381	3,150,000	1921.....	65,994	1,364,217
1894.....	6,047	125,000	1908.....	174,150	3,600,000	1922.....	54,456	1,125,705
1895.....	12,094	250,000	1909.....	191,565	3,960,000			
1896.....	14,513	300,000	1910*	221,091	4,570,362			
1897.....	120,937	2,500,000	1911.....	224,197	4,634,574			
1898.....	488,750	10,000,000	1912.....	268,447	5,549,296	Total.....	8,624,842	178,291,328

†Calculated from the value: one dollar=0.048375 oz.

*Including a small production from lode mines, from 1910 to 1922 inclusive.

Since 1906 a royalty of two and one half-per cent on all gold produced has been collected by the Canadian Government which places a nominal value of \$15 per crude ounce recovered. The statistics shown for these years are based on the returns supplied by the Mining Lands and Yukon Branch of the Department of the Interior, in which the fine gold is estimated as 80 per cent of all crude gold, fine silver as 12 per cent, and the remaining 8 per cent is regarded as worthless base metals.

The Vancouver Assay Office, which is operated by the Department of Mines, Ottawa, receives and melts a considerable portion of the placer gold from the Yukon. During 1922 there was deposited from this territory 69,161.19 ounces, valued, after all charges had been deducted at \$1,126,702, or \$16.29 per ounce, as against 82,219.92 ounces, valued at \$1,340,224.97, or \$16.30 per ounce in 1921.

Table 53.—Receipts from the Yukon, at the Dominion Government Assay Office, Vancouver, B.C., 1908-1922

Year	Weight before Melting	Net Value	Average Value	Year	Weight before Melting	Net Value	Average Value
	Ounces	\$	\$		Ounces	\$	\$
1908 (a).....	60,132.00	1,000,296	16.63	1915.....	87,040.87	1,418,497	16.28
1909.....	5,003.12	83,871	16.75	1916.....	95,005.82	1,525,724	16.06
1910.....	3,594.87	62,094	17.27	1917.....	79,532.35	1,262,207	15.87
1911.....	2,073.61	34,944	16.88	1918.....	121,310.37	1,921,198	15.84
1912.....	2,211.88	36,481	16.41	1919.....	111,138.65	1,813,883	16.32
1913 (b).....	15,235.29	247,189	16.22	1920.....	74,456.01	1,206,579	16.21
1914.....	56,564.83	915,914	16.21	1921.....	82,219.92	1,340,225	16.30
				1922.....	69,161.19	1,126,702	16.29

(a) For nine months only.

(b) The removal in 1913 of the assay charge accounts for the great increase.

Table 54.—Production of Crude Gold in the Yukon, 1920, 1921 and 1922

(Gross weight of dust, nuggets, and bullion in ounces)

Month	1920	1921	1922
January.....	280.78	813.77	18.90
February.....	18.00	622.22	815.64
March.....	9,497.14	22.85	295.52
April.....	140.52	36.18	82.30
May.....	44.42		
June.....	10,505.24	14,717.00	14,360.08
July.....	11,018.56	13,585.40	10,288.07
August.....	12,865.26	14,742.48	8,063.47
September.....	8,575.41	11,773.73	15,635.29
October.....	32,243.87	22,106.00	11,667.89
November.....	3,992.30	3,183.19	4,613.04
December.....	1,756.72	791.75	2,092.53
Total.....	90,938.22	82,394.57	67,961.73

Between 1898 and March 31, 1923, a royalty to the extent of \$4,834,913.81 was collected on the gold production of this district. The yearly amounts collected, as well as the annual production of gold as ascertained by the Department of the Interior, are shown below. The difference between these figures and those shown in the table of annual production, which are based on mint receipts of Yukon gold is probably due to three factors: (1) the fixing of the value of the gold for royalty purposes at \$15 per ounce, (2) the probability that, in the earlier years of royalty collection, considerable quantities of gold dust left the camps unrecorded and escaped royalty payments, and (3) the fact that in the last few years there has been a small production from lode mines.

Table 55.—Gold Production in the Yukon and the Royalty Collected

(From the Report of the Mining Lands and Yukon Branch of the Department of the Interior, by Controller H. H. Rowatt)

Fiscal Year	Total Gold Production	Total Exemption	Royalty Collected on	Royalty Paid
	\$	\$	\$	\$ cts.
Ending June, 1898.....	3,072,773	339,845	2,732,928	273,292 82
Ending June, 1899.....	7,582,283	1,699,657	5,882,626	588,262 37
Ending June, 1900.....	9,809,464	2,501,744	7,307,720	730,771 99
Ending June, 1901.....	9,162,082	1,927,666	7,234,416	592,660 98
Ending June, 1902.....	9,566,340	1,199,114	8,367,226	331,436 79
Ending June, 1903.....	12,113,015		12,113,015	302,893 48
Ending June, 1904.....	10,790,663		10,790,663	272,217 96
Ending June, 1905.....	8,222,054		8,222,054	206,760 87
Ending June, 1906.....	6,540,007		6,540,007	163,963 25
Ending March, 1907.....	3,304,791		3,304,791	82,622 42
Ending March, 1908.....	2,820,162		2,820,162	70,504 65
Ending March, 1909.....	3,260,282		3,260,282	81,507 07
Ending March, 1910.....	3,594,251		3,594,251	89,844 10
Ending March, 1911.....	4,126,728		4,126,728	103,168 19
Ending March, 1912.....	4,024,237		4,024,237	100,606 29
Ending March, 1913.....	5,018,412		5,018,412	125,460 52
Ending March, 1914.....	5,301,508		5,301,508	132,537 69
Ending March, 1915.....	4,649,634		4,649,634	116,241 04
Ending March, 1916.....	4,458,278		4,458,278	111,457 19
Ending March, 1917.....	3,960,207		3,960,207	99,007 92
Ending March, 1918.....	3,266,019		3,266,019	81,650 55
Ending March, 1919.....	1,947,082		1,947,082	48,677 07
Ending March, 1920.....	1,660,450		1,660,450	41,501 12
Ending March, 1921.....	1,246,486		1,246,486	31,273 76
Ending March, 1922.....	1,230,987		1,230,987	30,774 68
Ending March, 1923.....	1,032,762		1,032,762	25,819 04
Total.....	131,760,957		124,692,941	4,834,913 81

Table 56.—World's Production of Gold*, 1913, 1918-1922

(In fine ounces).

	1913	1918	1919	1920	1921	1922
NORTH AMERICA—						
United States.....	4,299,784	3,320,784	2,918,628	2,476,166	2,422,006	2,375,019
Canada.....	802,973	699,681	766,764	766,913	924,374	1,230,000
Mexico.....	829,783	813,895	758,354	735,078	683,991	748,323
Total North America.....	5,932,540	4,834,360	4,443,746	3,978,157	4,030,371	4,353,342
Central America and West Indies.....	131,661	164,475	159,638	145,125	120,937	*121,000
South America—						
Bolivia.....	8,467	{ 242	242	242	290	.....
Chili.....	37,007	37,007	43,538	38,700	.....	.....
Brazil.....	109,072	135,450	96,750	125,775	134,482	.....
Colombia.....	143,757	290,250	290,251	280,575	290,250	.....
Ecuador.....	19,665	38,700	38,700	36,281	37,710	.....
Peru.....	23,813	57,645	65,232	62,757	77,385	.....
Guiana—British.....	65,475	24,546	16,216	9,675	12,828	.....
Dutch.....	22,757	18,851	15,932	12,506	12,094	.....
French.....	147,571	57,741	53,212	43,538	48,375	.....
Venezuela.....	21,517	22,891	29,025	18,839	11,215	.....
Other countries.....	1,572	677	677	4,858	3,967	.....
Total South America.....	563,666	684,000	643,244	638,584	667,296	*667,000
EUROPE—						
Austria-Hungary.....	105,425	8,708	.....	.....	.....	.....
Czecho-Slovakia.....	.....	.....	6,076	8,761	11,413	11,400
France.....	102,912	24,187	7,298	.....	.....	.....
Great Britain.....	864	.....	.....	32	.....	.....
Russia and Siberia.....	1,282,313	580,500	532,115	57,225	45,000	119,050
Other countries.....	24,290	1,903	1,446	9,116	9,646	9,600
Total Europe.....	1,515,804	615,298	546,935	75,134	66,059	140,050
AUSTRALASIA—						
New South Wales.....	149,657	87,044	65,839	48,907	51,173	25,000
Queensland.....	265,735	133,571	121,030	115,230	40,376	79,332
South Australia.....	6,556	6,189	3,224	1,697	2,628	2,600
Victoria.....	434,932	158,827	135,425	168,979	104,512	106,872
West Australia.....	1,314,043	876,508	734,066	617,842	664,950	538,245
New Zealand.....	343,595	208,654	222,063	124,375	124,375	*124,000
Tasmania.....	33,400	10,529	7,686	6,246	5,340	3,400
Other countries.....	21,393	9,232	12,508	12,502	9,779	*9,000
Total Australasia.....	2,569,311	1,490,554	1,301,844	1,095,778	1,003,133	888,449
ASIA—						
British India.....	589,109	485,236	507,260	499,068	470,000	427,000
China.....	176,999	174,150	159,637	125,000	100,000	*100,000
Chosen (Korea).....	173,306	159,637	135,450	76,000	75,000	*75,000
British East Indies.....	65,402	35,556	31,444	29,025	24,188	*24,000
Dutch East Indies.....	163,852	88,836	92,592	90,920	94,168	*94,000
Formosa.....	39,406	24,850	20,186	13,500	12,000	*12,000
Japan.....	174,846	246,998	233,405	248,181	229,671	233,809
Other countries.....	24,596	20,727	39,810	29,366	30,637	*31,000
Total Asia.....	1,407,516	1,235,990	1,219,784	1,111,060	1,035,664	996,899
AFRICA—						
Belgian Congo.....	44,334	117,733	108,442	96,804	65,715	*66,000
Madagascar.....	60,769	23,887	22,505	16,686	14,660	14,500
Rhodesia.....	690,541	631,358	593,446	553,067	586,908	655,500
British West Africa.....	384,836	314,860	225,226	230,948	203,599	*200,000
Transvaal, Cape Colony and Natal.....	8,798,713	8,418,377	8,331,651	8,331,651	8,128,722	7,232,000
Other countries.....	45,623	26,028	33,476	26,905	31,724	30,000
Total Africa.....	10,024,816	9,532,234	9,314,746	9,256,061	9,031,328	8,198,000
Grand Total.....	22,145,314	18,556,920	17,629,977	16,299,899	15,954,788	15,364,650

*1913-1921, as reported by the Director of the Mint with the exception of the Mexican figures which have been revised.
 1922, as compiled by American Bureau of Metal Statistics, conjectural figures (*) based on the 1921 outputs being inserted where necessary.

IRON ORE

The total shipments of iron ore from Canadian mines during 1922 amounted to 17,971 short tons, the net value of which was reported as \$56,993 as compared with 59,509 tons shipped in 1921 with a value of \$230,164. This production was the lowest recorded during the past 21 years, and included 300 tons of roasted siderite worth \$937; roasted magnetites to the extent of 15,890 tons valued at \$51,118, produced in Ontario; and 1,781 tons of exported magnetite ore valued at \$4,938, of which 1,255 tons was mined in British Columbia and the remaining 526 tons was shipped from stocks in Quebec province.

Pig iron derived from Canadian ores smelted in Canadian blast furnaces during the period totalled 8,095 short tons which at the year's average price for pig iron of \$22.11 per short ton had a computed value of \$178,980.

No domestic ores were mined in Nova Scotia during the period but the British Empire Steel Corporation continued to operate their iron mines in Newfoundland. The shipments during 1922 which were about three times greater than those of the previous year comprised 1,123,327 tons valued at \$2,187,344, of which 311,482 tons worth \$614,394 was shipped to Nova Scotia, the balance being exported to European points.

Table 56a—Summary of Iron and Steel Statistics, 1920, 1921 and 1922

	—	1920	1921	1922
	Short tons			
Iron ore shipped from mines.....	"	129,072	59,509	17,971
Canadian iron ore charged to blast furnaces.....	"	149,515	126,653	23,398
Imported.....	"	1,957,738	1,141,007	778,141
Iron ore charged to steel furnaces.....	"	64,146	36,308	24,980
Pig-iron made in blast furnaces.....	"	1,081,561	664,993	428,923
" electric furnaces.....	"	8,835	683	.....
" exported.....	"	102,628	2,685	17,236
" imported.....	"	57,483	18,636	58,796
Ferro-alloys made.....	"	28,173	24,594	23,239
" imported.....	"	7,908	2,295	3,771
" exported.....	"	25,422	10,031	20,350
Pig-iron and ferro-alloy consumption.....	"	1,181,228	708,278	477,143
" used in steel furnaces.....	"	732,486	465,750	313,000
Steel ingots and castings made.....	"	1,232,697	747,582	539,974
Steel rails made.....	"	255,322	298,110	140,970
Canadian coke used in iron blast furnaces.....	"	415,742	244,830	172,250
Imported.....	"	788,795	590,199	300,269
Number of completed blast furnaces.....	No.	20	20	20
Number of men employed at blast furnaces.....	"	1,179	617	555
Wages paid at blast furnaces.....	\$	2,186,779	922,276	769,584
Value of pig-iron produced.....	\$	29,939,676	15,518,582	8,819,242
" iron and steel goods exported.....	\$	84,357,906	32,620,942	41,800,812
" iron and steel goods imported.....	\$	249,632,055	127,470,117	126,467,856

PIG IRON

The total production of pig iron in Canada in 1922 was 428,923 tons having a value of \$8,819,242 as compared with a total production in 1921 of 665,676 tons valued at \$15,518,582, a decrease of 36 per cent in quantity and 43 per cent in value. The production in 1922 was all from blast furnaces. Approximately 100 tons was made in an electric furnace for experimental purposes but no value was placed on it and the amount is not included in the tonnage produced. Of the 1921 total, 683 tons was made in electric furnaces from scrap metal.

The production of blast furnace pig-iron in Nova Scotia in 1922 was 135,261 tons as against 169,504 tons in 1921. In Ontario the production during 1922 was 293,662 tons against 495,489 tons in 1921.

By grades the 1922 production included: basic, 283,697 tons; foundry and malleable, 145,226 tons. The production in 1921 by grades included: basic 516,967 tons; foundry and malleable, 148,026 tons; low phosphorus iron (electric furnace) 683 tons.

The blast furnace plants operated during 1922 included those of the Dominion Iron and Steel Company at Sydney, Nova Scotia; the Steel Co. of Canada at Hamilton, Ont., and the Algoma Steel Corporation at Sault Ste. Marie, Ont. The Canadian Furnace Company at Port Colborne and The Midland Steel Company at Midland did not operate during the year.

Electric furnaces were operated for the production of ferro-alloys at Welland, Niagara Falls, Thorold and Hamilton, all of which are served by hydro-electric power from Niagara Falls.

The production of ferro-alloys including ferro-silicon and spiegeleisen in 1922 amounted to 23,239 tons valued at \$828,834. In 1921 the production was 24,594 tons valued at \$998,279.

The exports of pig-iron during 1922 were 17,236 tons, valued at \$376,438 or an average of \$22 per ton, and of ferro-alloys, 20,350 tons, valued at \$897,272 or an average of \$44 per ton.

The exports of pig-iron were all to the United States. The ferro-alloy exports included 19,267 tons to the United States, and 1,083 tons to other countries.

The imports into Canada during 1922 included 58,796 tons of pig-iron, valued at \$1,266,268 or an average of \$22 per ton, and 3,771 tons of ferro-alloys, valued at \$237,574, or an average of \$63 per ton, making a total import of pig-iron and ferro-alloys of 124,209 tons valued at \$1,503,842. The United States trade records showed exports to Canada during 1922 of pig-iron and ferro-alloys amounting to 35,768 tons, valued at \$655,767.

Detailed statistics of the iron and steel industry in Canada are given in a special Bureau report entitled "Iron and Steel and their Products."

LEAD

The production of lead in Canada in 1922 amounted to 93,307,171 pounds (46,653.58 tons) which at the average market price in Montreal for the year of 6.235 cents per pound, was valued at \$5,817,702, as against 66,679,592 pounds (33,339.8 tons) valued at \$3,828,742 in 1921 when the average price was 5.742 cents, per pound. The increase amounted to about 40 per cent in quantity and 52 per cent in value.

The production in 1922 included (a) 88,606,869 pounds (44,303.4 tons) of pig lead produced at Trail, B.C., and Galetta, Ontario; (b) 4,670,621 pounds (2,335.3 tons), the estimated recoveries from lead ores and concentrates exported to the United States, and (c) 29,681 pounds (14.8 tons), estimated as recovered from ores and concentrates exported from Cobalt to United States smelters.

The corresponding figures for 1921 were (a) 62,333,281 pounds (31,166.6 tons); (b) 4,343,611 pounds (2,171.8 tons) and (c) 2,700 pounds (1.3 tons).

This production was mainly from British Columbia, with small amounts from Ontario, Quebec and Yukon Territory.

Table 58.—Production* of Lead from Canadian Ores, 1887-1922

Year	Pounds	Value	Cents per pound	Year	Pounds	Value	Cents per Pound
		\$				\$	
1887.....	204,800	9,216	5.400	1905.....	56,864,915	2,676,632	4.707
1888.....	674,500	29,812	4.420	1906.....	54,608,217	3,089,187	5.657
1889.....	165,100	6,488	3.930	1907.....	47,738,703	2,542,086	5.325
1890.....	105,000	4,704	4.480	1908.....	43,195,733	1,814,221	4.200
1891.....	88,665	3,857	4.350	1909.....	45,857,424	1,692,139	3.690
1892.....	808,420	33,064	4.090	1910.....	32,987,508	1,216,249	3.687
1893.....	2,135,023	79,636	3.730	1911.....	23,784,969	827,717	3.480
1894.....	5,703,222	187,636	3.290	1912.....	35,763,476	1,597,554	4.467
1895.....	16,461,794	531,716	3.230	1913.....	37,662,703	1,754,705	4.659
1896.....	24,199,977	721,159	2.980	1914.....	36,337,765	1,627,568	4.479
1897.....	39,018,219	1,396,853	3.580	1915.....	46,316,450	2,593,721	5.600
1898.....	31,915,319	1,206,399	3.780	1916.....	41,497,615	3,532,692	8.513
1899.....	21,862,456	977,250	4.470	1917.....	32,576,281	3,628,020	11.137
1900.....	63,169,821	2,760,521	4.370	1918.....	51,398,002	4,754,315	9.250
1901.....	51,900,958	2,249,387	4.334	1919.....	43,827,699	3,053,037	6.966
1902.....	22,956,381	934,095	4.069	1920.....	35,953,717	3,214,262	8.940
1903.....	18,139,283	768,562	4.237	1921.....	66,679,592	3,828,742	5.742
1904.....	37,531,244	1,617,221	4.309	1922.....	93,307,171	5,817,702	6.235

*Previous to 1913 the figures reported show the metal content of the shipments and are somewhat in excess of the actual amount recovered. Since 1912 the data given represent the quantity of lead produced in Canada from domestic ores, together with the estimated lead recovery from lead ores and concentrates exported. From 1887 to 1908, average prices at New York; 1909 and 1910, average prices at Toronto; from 1911 to date, average prices in Montreal were used in making up the values shown, since 1920 the quotations used have been furnished by the Consolidated Mining and Smelting Co., Montreal, Que.

PRODUCTION OF LEAD FROM CANADIAN ORES 1887-1922.

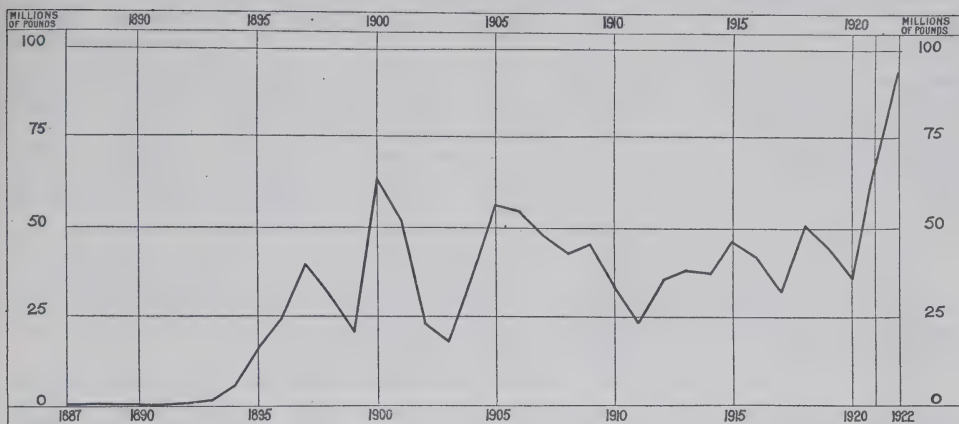


Table 59.—Production of Lead by Provinces, 1887-1922

Calendar Year	Quebec		Ontario		British Columbia		Yukon	
	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$	Pounds	Value \$
1887.....					204,800	9,216		
1888.....					674,500	29,813		
1889.....					165,100	6,488		
1890.....	105,000	4,704						
1891.....	88,665	3,857						
1892.....					808,420	33,064		
1893.....	3,931	146			2,131,092	79,490		
1894.....					5,703,222	187,636		
1895.....					16,461,794	531,716		
1896.....					24,199,977	721,159		
1897.....	177,084	6,340			38,841,135	1,390,513		
1898.....	221,760	8,382			31,693,559	1,198,017		
1899.....					21,862,436	977,250		
1900.....	11,200	490			63,158,621	2,760,031		
1901.....	318,052	13,784			51,582,906	2,235,603		
1902.....	420,000	17,090			22,536,381	917,005		
1903.....			50,000	2,119	18,089,283	766,443		
1904.....			885,000	38,135	36,646,244	1,579,086		
1905.....			284,212	13,378	56,580,703	2,663,254		
1906.....			2,200,000	124,454	52,408,217	2,964,733		
1907.....					47,738,703	2,542,086		
1908.....					43,195,733	1,814,221		
1909.....					45,857,424	1,692,139		
1910.....					32,987,508	1,216,249		
1911.....					23,784,969	827,717		
1912.....					35,763,476	1,597,554		
1913.....			33,000	1,537	37,626,899	1,753,037	2,804	131
1914.....					36,289,845	1,625,422	47,920	2,146
1915.....	40,401	2,262	88,985	4,983	45,377,064	2,541,116	810,000	45,360
1916.....	698,760	59,485	685,932	58,393	39,157,701	3,33,496	955,222	81,318
1917.....	1,378,001	153,468	1,586,711	176,712	29,483,725	3,283,602	127,844	14,238
1918.....	2,110,059	195,180	1,684,366	155,804	47,594,328	4,402,475	9,249	856
1919.....	2,280,000	158,825	1,487,586	103,625	40,060,113	2,790,587		
1920.....	905,472	80,949	2,255,520	201,643	32,792,725	2,931,670		
1921.....	595,881	34,215	3,312,493	19,203	60,298,603	3,462,346	2,472,615	141,978
1922.....			2,890,397	180,216	87,093,266	5,430,265	3,323,508	207,221
Totals.....	9,354,266	739,177	17,444,202	1,251,202	1,128,850,472	60,204,499	7,749,162	493,248

Table 60.—Shipments of Lead Ores and Concentrates from Canadian Mines in 1922

	Lead Ores	Lead Concentrates	Dry Ores
Tons shipped.....	17,245	8,823	998
Reported value of shipments.....	\$599,425	\$754,370	\$12,388
Metal Contents of Shipments—			
Gold.....fine ounces.	70	234	8
Silver.....“	1,285,348	611,843	19,922
Lead.....pounds	11,245,579	9,363,313	4,264
Zinc.....“	1,233,901		

Many of the ores of British Columbia contain both lead and zinc. Thus, in addition to the quantities noted in the above table there was 78,350,311 pounds of lead contained in zinc ores so termed because zinc was the predominating metal. Most of such shipments were from the Sullivan mine of the Consolidated Mining and Smelting Company.

Previous to 1904 lead ores mined in Canada were either exported as ore or smelted in Canadian furnaces and exported in the form of base bullion for refining. A lead refinery employing the Betts electrolytic process has been in operation at Trail, B.C. since 1904, treating the product from lead blast furnaces.

The production of refined lead at Trail amounted in 1922 to 39,276 tons, as against 28,820 tons in 1921; 13,237 tons in 1920 and 16,446 tons in 1919.

The Kingdon Mining, Smelting and Manufacturing Company, Limited, which is now smelting ores from the Kingdon mine at Galetta, Ont., has been in operation since early in 1919; the plant is operated by the Estate of James Robertson.

Table 61.—Refined Lead Produced in Canada,* 1904-1922

Year	Pounds of Refined Lead Produced	Year	Pounds of Refined Lead Produced	Year	Pounds of Refined Lead Produced
1904.....	7,519,440	1910.....	32,987,508	1916.....	33,087,474
1905.....	15,804,509	1911.....	23,525,050	1917.....	32,115,114
1906.....	20,471,314	1912.....	35,893,190	1918.....	31,571,112
1907.....	26,607,461	1913.....	37,923,043	1919.....	34,330,920
1908.....	36,549,274	1914.....	36,443,706	1920.....	28,720,030
1909.....	41,883,614	1915.....	43,518,618	1921.....	60,949,793
				1922.....	81,412,716

* Includes the electrolytic produced from Canadian and foreign ores at Trail, B.C., and also the pig-lead from Galetta, Ont.

The excellent position of lead in the world's markets has developed as a result of the unusually high prices prevailing for this metal. Although Canada's production of lead represents but a few per cent of the world's total output, the economic conditions governing its production in Canada are those which control the world's market as well. A comparison of the lead, copper and zinc situation in the United States as published in the "*Engineering and Mining Journal-Press*"¹ brings out some interesting facts bearing on the production of these metals: "The world's lead production did not show a great jump during the war and after. Furthermore the lead market was not plagued with exceedingly heavy stocks of surplus and second-hand metal after the Armistice. Then again the lead market (in the United States) is protected by a 2½ tariff. Another reason is that lead is insistently called for by European countries, whereas copper is not so much in demand as it should be. Lead producers for the last two years have been able to benefit by the flourishing condition of two great American industries—the building boom and automobile manufacture. The building trades use large amounts of lead in paints and pipe and every new automobile has a storage-battery with lead plates. Incidentally the storage battery business received a strong impetus from the demand for radio apparatus. Compare this with the situation in zinc and the contrast is striking. Zinc producers are chiefly dependent upon two outlets for their production, the galvanizing industry and the brass and alloy manufactures. When these two industries refrain from buying the market is severely depressed."

It may be of interest to point out some of the more salient features concerning Canada's production and trade in lead. Compared with the United States, the consumption by Canadian industries is very small and is not of such widespread character, but at the same time the conditions obtaining in the United States on lead consumption have a distinct bearing on similar Canadian industries.

The total value of the imports into Canada of lead and its products during the calendar year 1921 was \$486,902 as compared with \$3,003,258 in 1920. Data for 1922 show a slight gain over 1921. The decrease from the year 1920 while not proportional to the rise in the production of lead in Canada during the same period emphasizes the trend of the movements in the lead supply of Canada, and indicates to some extent that domestic lead is now supplying a greater portion of the home market. Much of the decrease may be accounted for by the lessened activity in manufacturing which was observed throughout 1921 and the greater part of 1922. The imports came principally from the United Kingdom, United States, Mexico and Japan. While the value of the Canadian imports has been decreasing, the record of the exports has been favourable and remarkable increases in the quantity of pig lead exported have been recorded. The best export customers for Canadian lead and its products during 1922 were Japan, the United Kingdom, and China in the order named. Small shipments were also made to Germany, Belgium and Newfoundland.

Table 62.—Imports into Canada and Exports of Lead, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
IMPORTS—						
Old and scrap, pig and block.....	27,002,717	2,206,200	1,781,230	87,228	2,001,987	105,527
Bars and sheets.....	768,726	67,872	236,696	15,411	263,612	17,957
Litharge.....	2,457,900	277,951	1,650,500	131,009	1,514,400	122,592
Acetate and nitrate of lead.....	152,584	21,491	171,561	18,471	217,487	20,330
Other manufactures.....		265,507		140,948		199,330
Pipe lead.....	48,769	5,185	72,238	5,026	96,716	6,458
Shots and bullets.....	117,224	10,497	14,152	1,081	10,324	4,173
Tea lead.....	251,273	34,119	140,259	12,586	225,729	21,530
Lead pigments:—						
Dry white lead.....	34,520	3,003	16,027	1,533	190,472	14,255
White lead, ground in oil.....	39,032	5,444	48,424	5,123	56,760	6,001
Dry red lead and orange mineral.....	967,533	110,989	795,275	68,486	966,846	74,921
Total.....		3,008,258		486,902		593,074
EXPORTS—						
Lead in ore.....	7,549,400	385,839	6,253,700	256,834	10,941,800	550,088
Pig-lead.....	18,800	1,846	23,779,700	992,485	41,481,900	1,877,050
Total.....	7,568,200	387,685	30,033,400	1,249,319	52,423,700	2,427,138

QUEBEC

Lead production in the province of Quebec dates from the year 1915 when some 40,000 pounds was produced, all of which was derived from the lead-zinc deposits of Notre Dame des Anges. The steady demand during the war led to the more active development of these deposits and in 1919 the output reached its maximum figure when over two-and-a quarter million pounds was produced. During 1922 no shipments were made from these mines.

ONTARIO

Production of lead in Ontario was carried on many years ago in Frontenac county, but it was not until 1913 when some 33,000 pounds was recovered that any statistical records have been kept. During that year the deposits in Carleton county were opened up and rapidly developed during the war period. The total Ontario production now comes from Galetta in Carleton County, where the Kingdon Mining, Smelting and Manufacturing Company operates its mine, mill and smelter. The peak of production came in 1921 when 3,312,493 pounds was recovered.

BRITISH COLUMBIA

The production of lead in British Columbia is derived from the zinc-lead ores of the East and West Kootenays. During 1922 the smelter production from British Columbia ores amounted to 87,093,266 pounds valued at \$5,430,265, which included the pig lead recovered in the treatment of Canadian ores in Canada and the quantities estimated as recovered from Canadian lead ores exported. Compared with the record for the year 1921, in which the production amounted to 60,298,603 pounds valued at \$3,462,346, there was an increase of 44.4 per cent in quantity and 56.8 per cent in value.

Table 63.—Monthly Average Prices of Lead in Montreal, New York and London, 1920, 1921 and 1922

Month	Montreal—cents per pound			New York—cents per pound			London—in £ Sterling per ton of 2,240 pounds		
	1920	1921	1922	1920	1921	1922	1920	1921	1922
January.....	9.90	6.093	6.152	8.561	4.821	4.700	£ s. d. 47 7 2	£ s. d. 23 13 3	£ s. d. 23 13 4
February.....	10.25	5.683	5.897	8.814	4.373	4.700	50 12 9	20 8 9	20 13 8
March.....	11.07	5.377	5.930	9.145	4.084	4.720	47 1 10	18 20 11	21 5 4
April.....	9.85	5.404	5.908	8.902	4.356	5.115	40 4 0	20 17 6	22 19 10
May.....	9.40	6.021	6.139	8.576	4.952	5.420	39 3 2	23 0 0	24 9 3
June.....	9.30	5.795	6.190	8.323	4.485	5.745	35 1 4	22 7 2	24 13 8
July.....	9.90	5.75	6.235	8.338	4.410	5.729	35 9 0	23 6 5	24 17 4
August.....	9.00	5.571	6.226	8.687	4.382	5.824	36 8 10	23 6 6	24 11 7
September.....	8.10	5.588	6.178	8.179	4.600	6.110	35 7 6	22 19 0	24 2 7
October.....	7.60	5.581	6.235	7.070	4.690	6.530	35 2 2	23 12 2	25 11 0
November.....	7.30	5.820	6.775	6.159	4.683	7.047	32 5 6	24 4 2	26 3 11
December.....	5.80	6.223	6.957	4.727	4.700	7.163	24 11 10	24 16 9	26 1 7
Average.....	8.873	5.742	6.235	7.957	4.545	5.734	38 4 7	22 6 7	24 1 11

Table 64.—World's Production of Lead, 1913, 1918-1922

(Compiled from the Year Book of the American Bureau of Metal Statistics)
(Short tons)

Country	1913	1918	1919	1920	1921	1922
NORTH AMERICA—						
United States.....	435,665	556,233	454,797	476,125	402,479	470,000
Canada.....	13,822	25,692	21,903	18,187	34,381	45,842
Mexico.....	68,324	97,530	86,667	93,925	66,851	133,180
Total North America.....	522,811	679,455	563,367	588,237	503,711	649,022
SOUTH AMERICA—						
Argentina.....		3,786	4,369	3,857	2,756	3,986
Other South America.....	2,729	1,482	2,865	3,047	2,385	2,558
Total South America.....	2,729	5,268	7,234	6,904	5,141	6,544
EUROPE—						
Austria.....	26,558	36,366	1,944	4,379	3,689	4,106
Belgium.....	59,056	22,734	4,656	17,681	32,793	39,683
France.....	31,756	14,081	12,043	13,224	11,023	13,200
Germany (including Upper Silesia).....	207,176	82,231	56,753	65,036	82,673	93,696
Greece.....	20,177	4,510	4,233	5,547	6,140	5,181
Italy.....	23,885	20,202	18,216	17,578	13,763	11,960
Czecho-Slovakia and Jugo-Slavia.....			9,663	7,367	7,191	7,385
Poland (Upper Silesia excluded).....	2,976			1,653	1,113	1,102
Russia.....	1,678					
Spain.....	219,110	187,019	138,545	138,890	135,583	106,923
Sweden.....	1,361	2,525	1,004	991	827	441
United Kingdom.....	20,304	12,213	11,506	12,275	5,777	3,307
Total Europe.....	614,037	381,881	258,563	284,621	300,572	286,984
ASIA—						
Turkey.....	15,318	2,755	1,102	1,102	9,199	3,417
India (Burma).....	6,535	21,357	20,747	26,679	37,737	43,919
Japan.....	4,162	11,774	6,360	4,607	3,459	3,307
Total Asia.....	26,015	35,886	28,209	32,388	50,395	50,643
Australia.....	126,207	186,729	92,654	7,642	63,071	118,656
AFRICA—						
Rhodesia.....		10,257	14,171	16,353	19,808	22,962
Tunis.....		18,224	11,380	12,574	13,911	14,457
Total Africa.....		28,481	25,551	28,927	33,719	37,419
Grand Total.....	1,291,799	1,317,700	975,578	948,719	956,609	1,149,268

MERCURY

There has been no production of mercury recorded since 1897. The small production reported in 1895, 1896, and 1897, was derived from the deposits at the western end of Kamloops Lake, B.C. These deposits consist of quartz veins containing pockets of cinnabar, in a zone of decomposed tertiary volcanic rocks.

Mercury has also been reported as occurring in ores of the Cobalt district, and in the neighbourhood of Field, B.C., and Sechart, on the west coast of Vancouver Island.

The Kerr Lake Mines, Limited, of Cobalt, Ont., in its annual report to the shareholders, reported recoveries of mercury amounting to 545.5 pounds in 1918, and 137.5 pounds in 1919.

The imports of mercury during 1922 were 59,296 pounds, valued at \$47,742, as against 30,894 pounds, valued at \$20,570, in 1921.

Table 65.—Production of Mercury in Canada, 1895-1922

Year	Flasks	Price per flask	Total Value
1895.....	71	\$ 33-00	\$ 2,343
1896.....	58	33-44	1,940
1897.....	9	36-00	324
1898-1922.....			

Table 66.—Imports into Canada of Mercury, 1920, 1921 and 1922

Year	Pounds	Value
1920.....	209,020	\$ 272,152
1921.....	30,894	20,570
1922.....	59,296	47,742

Table 67.—Monthly Average Price of Mercury, 1920, 1921 and 1922

(At New York, Per Flask of 75 pounds)

Month	1920	1921	1922
January.....	\$ 90-192	\$ 48-440	\$ 49-960
February.....	84-432	49-545	48-295
March.....	92-611	46-796	50-204
April.....	102-192	45-423	52-280
May.....	89-560	47-000	54-885
June.....	90-154	46-846	55-115
July.....	90-333	44-950	55-000
August.....	83-806	45-028	57-593
September.....	75-000	42-660	67-640
October.....	67-200	39-840	72-560
November.....	58-417	39-804	71-521
December.....	49-577	49-212	72-300
Average.....	81-123	45-462	58-946

MOLYBDENUM

There has been no production of molybdenite in Canada since 1919.

The war stimulated the demand for molybdenum ores to a considerable extent, but with the cessation of hostilities, the producers were left with considerable stocks on hand which could not very readily absorbed in peace times with the limited uses for the metal, apart from the making of ferro-molybdenum. The price declined accordingly to as low as 40 to 50 cents per pound for forced sales.

A few companies carried on development work during 1919 and 1920 but the only producer in 1919 was the Dominion Molybdenite Company, Limited, operating the property at Quyon, Que., for part of the year only.

The ore produced has been chiefly low-grade material carrying less than 2 per cent MoS_2 but included small quantities of ore running from 2 to 15 per cent MoS_2 and some higher grade hand-picked material.

All the ore produced in Canada has been concentrated in Canadian mills erected for the purpose, and marketed either as concentrates, molybdic acid, ammonium molybdate, or as ferro-molybdenum for the manufacture of which two electric furnace plants were established and operated during 1916, 1917, and 1918.

There has been no production of ferro-molybdenum since February, 1918.

There are molybdenite deposits in Nova Scotia, Quebec, Ontario, Manitoba, and British Columbia. The principal production has come from the Quyon mine, in Pontiac county, Quebec.

Prices.—The market quotations in January, 1922, for molybdenum ore, 85 per cent MoS_2 were 54 to 58 cents per pound of contained sulphide and in June were 50 cents per pound with a good demand. By the end of the year the price had risen to 70 cents.

Table 68.—Production of Molybdenite in Canada, 1902-1922

Year	Ores mined	Ores treated	Ores and concentrates shipped		MoS ₂ Contents of shipments	MoS ₂ production (probable recovery)	
	Tons	Tons	Tons	Value (a)	Pounds	Pounds	Value (b)
1902.....	3	.....	3.3	\$ 400	(c)	(c)	(c)
1903.....	600	.....	85.0	1,275	(c)	(c)	(c)
1904-1913.....	.....	.....	.....	.....	.....	.....	.....
1914.....	166	.....	16.5	2,063	3,814	3,814	\$ 2,063
1915.....	2,242	216	39.0	28,920	29,210	29,210	28,450
1916.....	13,522	9,106	610.0	188,316	156,461	156,461	156,461
1917.....	26,871	22,605	1,554.3	320,006	330,316	288,705	288,705
1918.....	34,030	33,935	461.3	428,807	378,482	378,029	434,733
1919.....	7,280	6,783	46.0	69,203	83,002	83,002	69,203
1920-1922.....	.....	.....	.....	.....	.....	.....	.....

(a) Value as given by the operators.

(b) Estimated at the average market value of molybdenite.

(c) No figures available.

NICKEL

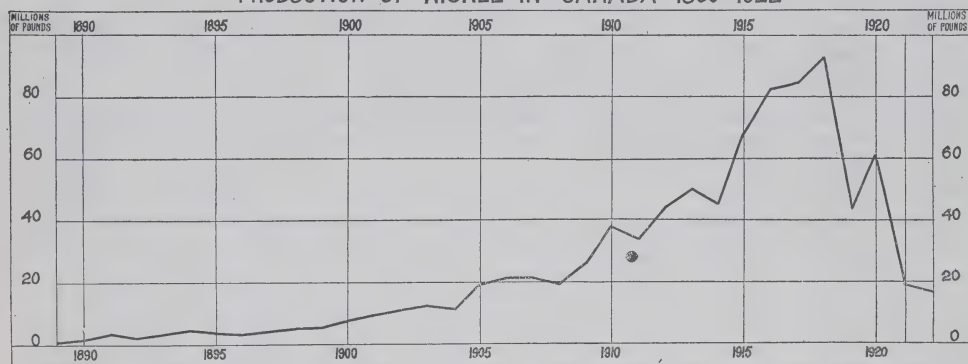
The nickel industry during 1922 was slowly recovering from the severe decline which set in at the end of the war. The slight advance in the price of the associated metal copper was of some benefit. In the month of August the International Nickel Company commenced shipping matte to its refinery at Port Colborne which resumed operations in September and the Mond Company which had produced at a reduced rate during the year increased its production and shipped large quantities of matte toward the end of the period.

Owing to the stagnant condition of the nickel market, the production of this metal in 1922 was lower than in any year since 1904, and compared with 1918, the banner year to date, the production of 1922 showed a decrease to only 19 per cent of the quantity and 16.7 per cent of the value. The output included 17,355,056 pounds contained in nickel-copper matte made by the Canadian smelters treating Sudbury ores and 242,067 pounds, the nickel contents of smelter products resulting from the treatment of silver-cobalt ores.

Table 69.—Production of Nickel in Canada, 1889-1922

Year	Pounds of nickel	Cents per pound	Value	Year	Pounds of nickel	Cents per pound	Value
			\$				\$
1889.....	830,477	60	498,286	1906.....	21,490,955	42	8,948,834
1890.....	1,435,742	65	933,232	1907.....	21,189,793	45	9,535,497
1891.....	4,035,347	60	2,421,208	1908.....	19,143,111	43	8,231,538
1892.....	2,413,717	58	1,399,956	1909.....	26,282,991	36	9,461,877
1893.....	3,982,982	52	2,071,151	1910.....	37,271,033	30	11,181,310
1894.....	4,907,430	38½	1,870,958	1911.....	34,098,744	30	10,229,623
1895.....	3,888,525	35	1,360,984	1912.....	44,841,542	30	13,452,463
1896.....	3,397,113	35	1,188,990	1913.....	49,676,772	30	14,903,032
1897.....	3,997,647	35	1,399,176	1914.....	45,517,937	30	13,655,381
1898.....	5,517,690	33	1,820,838	1915.....	68,308,657	30	20,492,597
1899.....	5,744,000	36	2,067,840	1916.....	82,958,564	35	29,035,497
1900.....	7,080,227	47	3,327,707	1917.....	84,330,280	40	33,732,112
1901.....	9,189,047	50	4,594,523	1918.....	92,507,293	40	37,002,917
1902.....	10,693,410	47	5,025,903	1919.....	44,544,883	40	17,817,953
1903.....	12,505,510	40	5,002,204	1920.....	61,335,706	40	24,534,282
1904.....	10,547,883	40	4,219,153	1921.....	19,293,060	35	6,752,571
1905.....	18,876,315	40	7,550,526	1922.....	17,597,123	35	6,158,993

PRODUCTION OF NICKEL IN CANADA 1889-1922



During the year, 259,569 tons of nickel-bearing ore was mined in the Sudbury district. The smelters treated 314,120 tons and produced 17,324 tons of matte carrying 8,677.5 tons of nickel and 5,420.8 tons of copper. In 1921 the nickel-copper ore mined amounted to 257,154 tons, and smelted, 393,768 tons, from which was produced 19,497 tons of Bessemer matte carrying approximately 9,628.4 tons of nickel and 6,322.6 tons of copper.

The average metal recovery in matte from the ore treated in 1921 was 2.75 per cent nickel and 1.72 per cent copper; in 1922 the recoveries were 2.44 per cent nickel and 1.72 per cent copper.

Table 70.—Proportion of Nickel and Copper in Sudbury Matte, 1912-1922

Year	Percentage		
	Nickel	Copper	Total
1912.....	53.5	26.3	79.8
1913.....	52.7	27.4	80.1
1914.....	49.0	31.1	80.1
1915.....	50.3	29.0	79.3
1916.....	51.6	28.0	79.6
1917.....	50.6	26.9	77.5
1918.....	52.6	26.0	78.6
1919.....	51.6	28.3	79.9
1920.....	52.7	27.6	80.3
1921.....	49.4	32.4	81.8
1922.....	50.1	31.3	81.4

Monel metal is also produced directly from nickel-copper mattes, and contains about 22 per cent copper and 28 per cent nickel. The ability to resist the corrosive action and other solutions which readily attack steel has given this metal an importance in many lines of manufacturing. No production of monel metal was reported in 1922.

Refineries.—The new refinery erected at Port Colborne, Ontario, by the International Nickel Company of Canada, Limited, which started operations in July, 1918, was the first to produce refined nickel in Canada from Sudbury ores. This plant was idle throughout most of the year 1921, but was re-opened about the middle of 1922. The International Nickel Company formerly exported some of its matte to its plant at Bayonne, N.J. This plant was dismantled during the early part of 1922 and a portion of the Sudbury matte was treated at Huntington, W. Va., U.S.A. The British America Nickel Corporation refinery at Deschenes, Quebec, which was not operated during the period also produces refined nickel and copper. The residues containing the precious metals are exported for treatment. The matte produced by the Mond company was all exported to Swansea, Wales, for further treatment.

The production from the refinery at Port Colborne in 1922 was (a) metallic nickel, 11,065,473 pounds (5532.7 tons) valued at \$3,140,399 and (b) nickel oxides 2,389,840 pounds valued at \$1,852,727.

The corresponding figures for the year 1921 which refer to the Deschenes refinery as well as the Port Colborne plant were (a) 5,419,174 pounds valued at \$1,821,917 and (b) 7,812,673 pounds valued at \$1,582,036.

There was also a small production of nickel from the silver-cobalt-nickel smelters, in the form of metallic nickel, nickel oxides, mixed oxides and the sulphate of the metal. The record of production from these plants is shown in the following table:—

Table 71.—Production from the Silver-Cobalt-Nickel Smelters of Eastern Ontario

Year	Metallic Nickel		Nickel-Oxides*		Nickel contents of recoveries
	Pounds	Value	Pounds	Value	Pounds
		\$		\$	
1912.....			* 91,377	9,137	†
1913.....			*268,304	30,122	†
1914.....			*392,512	34,883	†
1915.....	55,325	22,130	†282,025	31,262	231,634
1916.....	79,860	31,538	†555,868	101,358	361,702
1917.....	265,896	108,334	†657,549	122,963	556,961
1918.....	243,186	88,720	†962,309	215,277	736,005
1919.....	397,884	137,435	†340,389	32,862	474,274
1920.....	204,537	71,287	†24,112	6,312	221,150
1921.....	10,973	3,442	†105,535	4,034	36,160
1922.....	106,318	31,035	†37,317	3,952	**137,619

*Does not include mixed oxides of cobalt and nickel. See Chapter on Cobalt.

†Nickel-sulphate included with nickel oxides.

‡Figures not available.

**Does not include 104,449 pounds contained in Residues.

The total estimated nickel contents of the compounds recovered by these silver smelters of Ontario from the treatment of silver-cobalt-nickel ores was somewhat greater than as shown above, including in addition a small quantity of nickel which was contained in residues exported. The total production in 1922 was 242,067 pounds as against 36,160 pounds in 1921 and 221,150 pounds in 1920.

Prices.—The average price of electrolytic nickel in New York during 1921 according to quotations published by the "*Engineering and Mining Journal-Press*" was 44 cents per pound for ingots and 41 cents for shot. Quotations were merely nominal owing to the depressed state of the market. During 1922 nickel was being increasingly used for new purposes. Whereas, prior to and during the war a very large proportion of the metal was consumed by armament manufacturing, the cessation of war activities followed by the Washington conference on the limitation of armaments, led the producers to investigate new outlets for nickel. These have in part been found in the adaptability of nickel for the cooking-utensil trade, resistance wires in electrical heating appliances, coinage, alloys, and the growing importance of the metal in the motor car industry. This consumption coupled with a much lower price has been the important factor in the renewed activity. The average price for the year 1922 was 35 cents per pound.

Table 72.—Imports into Canada and Exports of Nickel, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
IMPORTS—		\$		\$		\$
Nickel, nickel-silver, German silver, ingots and blocks.....	7,197	3,260	770	421	42,286	13,257
Nickel, nickel-silver, German silver, bars, rods, strips, sheets and plates.....	728,466	253,299	330,420	125,874	386,764	100,730
Mfrs. of German, Nevada and nickel-silver not plated.....		570,984		262,250		203,838
Nickel plated ware n.o.p.....		2,000,767		1,279,501		1,314,688
Total.....		2,828,310		1,668,046		1,632,513
EXPORTS—						
Nickel, fine contained in ore, matte or speiss.....	51,701,000	9,006,140	8,064,600	1,418,490	16,768,200	2,536,347
Nickel, fine.....	8,498,300	2,982,717	4,794,500	1,684,454	14,449,700	4,287,941
Total.....	60,199,300	11,988,857	12,859,100	3,102,944	31,217,900	6,824,288

PLATINUM AND PALLADIUM

The most important sources of the metals of the platinum group in Canada are the nickel-copper ores of Sudbury, Ontario, but due to the fact that these metals occur in very small quantities per ton of ore and also that their recovery could only be made in the refining of the copper and nickel, the bulk of the Canadian platinum from this source has been recovered in foreign countries. It was not until 1918, when the International Nickel Company of Canada built its refinery at Port Colborne, that these metals were recovered in Canada. The British America Nickel Corporation Limited, opened its large refinery at Deschenes, Quebec, the following year. In both these plants, the precious metals are recovered as residues which are exported for further treatment. The mattes produced by the Mond Nickel Company which have all been treated in Swansea, Wales, are supposed to have a much richer content of platinum and its associated metals, but as yet no certified returns as to the precious metal content of its mattes have ever been received from this company.

For many years there has been a more or less regular recovery at the New Jersey plant of the International Nickel Company of metals of the platinum group from residues obtained in the refining of the Sudbury Nickel copper mattes; but as residues from other sources were treated with those of Canadian ores, the total recovery could not be regarded as of Canadian origin; nevertheless, it is believed that the Sudbury mattes have been the source of by far the greater part of the platinum group metals recovered. This New Jersey plant operated for a month or two only during 1922 and was then dismantled.

Platinum is also found in the alluvial sands of British Columbia, but the output which up to the present has been won by individual placer operators, is of small importance.

The recorded production during the year 1922 was as follows: International Nickel Company and British America Nickel Corporation refineries, 458 fine ounces platinum, 724 fine ounces of palladium and 391 fine ounces of rhodium, ruthenium, osmium and iridium combined. This production includes 282 fine ounces of platinum, 383 fine ounces of palladium and 266 fine ounces of the combined metals (rhodium, ruthenium, etc.), which were produced in previous years but credited to 1922 in order to complete the record. The British Columbia placers produced 11 fine ounces of platinum and 1 ounce of rhodium. The total for Canada during 1922 amounted to 469 fine ounces of platinum worth \$45,783; 724 fine ounces of palladium valued at \$47,060; and 392 fine ounces of the combined rhodium, ruthenium, osmium and iridium valued at \$31,360. The values per ounce used were the average quotations for the year viz., \$97.618 for platinum; \$65 for palladium and \$80 for the remaining metals.

Table 73.—Summary of Platinum Statistics, 1921 and 1922

	1921			1922		
	Platinum	Palladium	Rhodium, etc.	Platinum	Palladium	Rhodium, etc.
Produced by Canadian and United States refineries from Canadian mattes and resi- dues, Fine ozs. Value	269 \$21,014	590 \$26,613	56 \$3,433	458 \$44,709	724 \$47,060	391 \$31,280
British Columbia placers Fine ozs. Value	23 \$1,585			11 \$1,074		1 \$80
Total for Canada..... Fine ozs Value	292 \$22,599	590 \$26,613	56 \$3,433	(a) 469 \$45,783	(b) 724 \$47,060	(c) 392 \$31,360

(a) includes 282 ounces Platinum
(b) includes 383 ounces Palladium
(c) includes 266 ounces of others

} Produced but not reported prior to 1922.

Table 74.—Production of Platinum in Canada from Alluvial Sands, 1887-1922

Year	Value	Year	Value	Year	Crude Ounces	Value
	\$		\$			\$
1887.....	5,600	1897.....	1,600	1907-1912.....		
1888.....	6,000	1898.....	1,500	1913.....	18	489
1889.....	3,500	1899.....	825	1914.....		
1890.....	4,500	1900.....		1915.....	23	1,063
1891.....	10,000	1901.....	457	1916.....	15	600
1892.....	3,500	1902.....	190	1917.....	57	3,823
1893.....	1,800	1903.....		1918.....	39	2,560
1894.....	950	1904.....	420	1919.....	25	2,150
1895.....	3,800	1905.....	500	1920.....	17	719
1896.....	750	1906.....		1921.....	23	1,585
				1922.....	12	1,154

Table 75.—Recovery at the International Nickel Company's Works*—New Jersey, U.S.A., 1907-1922

Year	Matte treated	Gold	Silver	Platinum	Palladium	Rhodium	Others
	Tons	Ounces	Ounces	Ounces	Ounces	Ounces	Ounces
1907.....	17.840	993.572	63,400.70	226.800	607.300	(a)	
1908.....	18.839	5,238.181	139,329.29	172.316	328.287	(a)	
1909.....	18.407	2,113.669	63,138.66	546.627	1,270.598	(a)	
1910.....	24.309	2,649.799	60,256.83	258.325	522.804	(a)	
1911.....	26.840	2,203.052	70,954.38	655.552	753.363	(a)	
1912.....	27.653	2,476.558	62,169.66	498.850	680.130	(a)	
1913.....	38.733	2,336.405	77,924.03	192.863	207.713	191.067	
1914.....	40.267	2,695.957	75,928.18	748.440	755.360	515.801	
1915.....	31.428	3,444.785	101,793.17	452.430	543.240	57.475	
1916.....	56.405	3,495.123	110,285.21	1,016.581	1,344.915	257.070	
1917.....	59.209	1,954.934	92,963.67	970.695	1,354.459	325.407	
1918.....	62.250	1,968.703	107,076.78	649.737	786.654	472.579	
1919.....	19.528	634.043	35,689.79	616.716	762.217	227.294 (b)	76.613
1920.....	30.740	613.338	81,882.78	488.901	739.158	390.336 (b)	102.363
1921.....	(c) 2,217.000	6.901	1,242.74	281.582	382.626	256.110 (b)	10.655
1922.....	(c) 3,112.000	206.542	12,211.66	137.882	300.839	103.874 (b)	20.563

*Plant dismantled during 1922.
(a) Figures not given separately.
(b) Includes Osmium, Iridium and Ruthenium.
(c) These quantities bear no relation to the amounts of precious metals recovered.

Table 76.—Recovery of Platinum Black, Iridium Precipitate, and Palladium at the Royal Mint, Ottawa, 1919-1922

Year	Platinum		Iridium		Palladium	
	Ozs. gross	Value	Ozs. gross	Value	Ozs. gross	Value
1919.....	29.281	\$ 2,711.59	20.782	\$ 2,268.12	0.696	\$ 87.00
1920.....	7.220	\$ 400.56				
1921.....	18.843	\$ 1,160.73				
1922.....	12.386	\$ 1,102.35				

Table 77.—Imports into Canada and Exports of Platinum, 1920, 1921 and 1922

Item	1920		1921		1922	
	Ounces	Value	Ounces	Value	Ounces	Value
		\$		\$		\$
EXPORTS—						
Jewellers sweepings.....		284.493		229.525		216.118
Ores and concentrates.....	473	53,956	876	63,380	35	3,626
Old and scrap.....	317	31,784	304	18,931	151	13,328
Total.....		370,233		311,836		233,072
IMPORTS—						
Crucibles.....		13,772		6,198		3,976
Wire and bars, strips, sheets or plates.....		105,718		84,011		91,425
Retorts, pans, condensers, etc.....		6,487		4,342		887
Total.....		125,977		94,551		96,288

Table 78.—Monthly Average Prices of Platinum*, 1920, 1921 and 1922

(From the Engineering and Mining Journal-Press)

(In dollars per fine ounce.)

Month	1920	1921	1922
	\$	\$	\$
January.....	154.23	73.400	97.260
February.....	151.59	70.227	89.545
March.....	138.56	72.463	87.500
April.....	127.04	73.404	87.500
May.....	97.50	73.740	85.529
June.....	85.19	74.942	87.212
July.....	83.94	70.440	90.180
August.....	111.44	73.222	98.370
September.....	115.20	75.960	117.280
October.....	101.70	81.800	109.440
November.....	84.75	82.609	108.000
December.....	79.62	78.192	113.600
Average.....	110.90	75.033	97.618

Prior to the war the world's supply of platinum was derived almost entirely from the Ural mountains, Russia, but when hostilities commenced in the fall of 1914 the Russian production was reduced almost one-third. The subsequent internal troubles further crippled the platinum industry in that country and only a relatively small production has been made during the last few years.

SILVER

SPECIAL NOTE—Prior to 1922, the method used in compiling the statistics on the silver production of Canada was to include, except for Ontario, the quantities of silver produced from Canadian ores either in Canadian or foreign smelters. For Ontario, the sales of silver bullion from the mines and smelters were considered as the year's production. In order to bring the practice for Ontario into harmony with that used in computing the silver output for the other provinces, adjustments amounting to 1,222,450 ounces have been made for 1922 to take account of the stocks of silver bullion on hand at the end of 1921 which had not been previously included in the reports of the mineral production of Canada.

As above defined, the production of silver in Canada during 1922 amounted to 18,626,439 fine ounces which at the average price for the year of 67.521 cents an ounce was valued at \$12,576,758 as against 13,543,198 fine ounces valued at \$8,485,355 for 1921, an increase of 37 per cent in quantity and 48 per cent in value.

The production in 1922 included (a) silver contained in silver and gold bullion (including the adjustments noted above) 10,077,909 fine ounces or 54.1 per cent, (b) silver contained in blister copper and lead bullion, 3,572,554 fine ounces or 19.1 per cent, (c) silver estimated to have been recovered from ores, etc., exported, 4,975,976 fine ounces or 26.8 per cent. The corresponding figures for 1921 were (a) 9,080,718 ounces or 67 per cent, (b) 1,649,057 ounces or 12 per cent, (c) 2,813,423 ounces or 21 per cent.

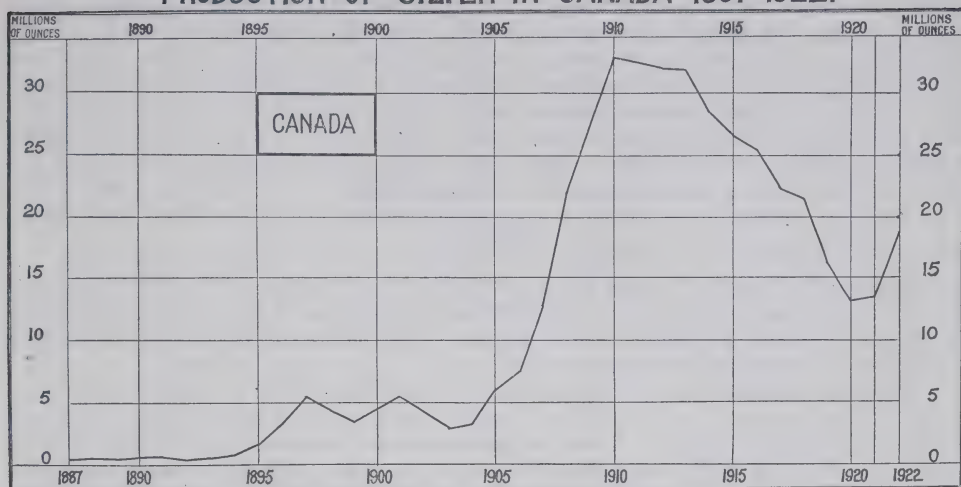
Although no official statistics of the production of silver had been published prior to 1887, the annual reports of the operating companies showed that from 1869 to 1885 about four million ounces of silver with a probable value of \$4,800,000 was produced. The producing mines were situated in the Port Arthur district in Ontario. From 1887 to 1893 the production ranged in value between \$300,000 and \$400,000 and was derived chiefly from Ontario and Quebec. The next three years saw a rapid increase in production due to the development of the silver-lead deposits of British Columbia, and in 1896 a production of over \$2,000,000 was recorded. From that year until 1905 the production varied between \$2,000,000 and \$3,500,000 rising rapidly during the next six years to \$17,580,455 in 1910, as a result of the discovery of the rich ores of the Cobalt district. Since then there has been a falling-off in quantity, but owing to the higher price of the metal, the value of the annual production increased to a maximum of \$20,693,704 in 1918. It will be noticed in the table of production that the output for 1919 though only 50 per cent of that of 1910 or 1911, when the production was at its maximum, was more than equal in value.

Table 79.—Production of Silver in Canada, 1887-1922

Year	Ounces	Value	Cents per ounce	Year	Ounces	Value	Cents per ounce
		\$				\$	
1887.....	355,083	347,271	98-00	1906.....	8,473,379	5,659,455	66-79
1888.....	437,232	410,998	94-00	1907.....	12,779,799	8,348,659	65-33
1889.....	383,318	358,785	93-60	1908.....	22,106,233	11,686,239	52-86
1890.....	400,687	419,118	104-60	1909.....	27,529,473	14,178,504	51-50
1891.....	414,523	409,549	98-00	1910.....	32,869,264	17,580,455	53-49
1892.....	310,651	272,130	86-00	1911.....	32,559,044	17,355,272	53-30
1893.....	428,738	330,128	77-00	1912.....	31,955,560	19,440,165	60-83
1894.....	847,697	534,049	63-00	1913.....	31,845,803	19,040,924	59-79
1895.....	1,578,275	1,030,299	65-28	1914.....	28,449,821	15,593,631	54-81
1896.....	3,205,343	2,149,503	67-06	1915.....	26,625,960	13,228,842	49-68
1897.....	5,558,446	3,323,395	59-79	1916.....	25,459,741	16,717,121	65-66
1898.....	4,452,333	2,593,929	58-26	1917.....	22,221,274	18,091,895	81-417
1899.....	3,411,644	2,032,658	59-58	1918.....	21,383,979	20,693,704	96-772
1900.....	4,468,225	2,740,362	61-33	1919.....	16,020,657	17,802,474	111-122
1901.....	5,539,192	3,265,354	58-95	1920.....	13,330,357	13,450,330	100-900
1902.....	4,291,317	2,238,351	52-16	1921.....	13,543,198	8,485,355	62-654
1903.....	3,198,581	1,709,642	53-45	1922.....	18,626,439	12,576,758	67-521
1904.....	3,577,526	2,047,095	57-22				
1905.....	6,000,023	3,621,133	60-35				
				Grand total.....	434,638,815	279,763,532	64-367

Ontario has been the main producer of silver in Canada since the year 1906, its contribution increasing from 41 per cent of the total for Canada in 1905 to a maximum of 94 per cent in 1911. By 1914, it had fallen to 88.4 per cent and has been gradually decreasing each year reaching 25 per cent in 1921 and rising again to 48.2 per cent in 1922, excluding the corrective figures mentioned as included, in the special note at the beginning of this chapter.

PRODUCTION OF SILVER IN CANADA 1887-1922.



The production of British Columbia which has fluctuated between two and five million ounces for the last twenty-five years from 1914 to 1917 between 11 and 12 per cent of the total Canadian production. In 1921 it was 24·8 per cent of the total and in 1922 the total reached 38·2 per cent.

The balance of the production, 3·8 per cent in 1922 as against 3·3 per cent in 1921 and 0·7 per cent in 1920 was derived from Manitoba and the Yukon Territory. This relatively large increase from 0·7 to 3·3 per cent in 1921 for these areas was accounted for by the rich shipments of argentiferous galena from Keno Hill in the Yukon Territory.

Table 80.—Production of Silver in Canada, by Provinces, 1887-1922*

Year	Ontario		Quebec		British Columbia		Yukon Territory	
	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value
		\$		\$		\$		\$
1887	190,495	186,304	146,898	143,666	17,690	17,301		
1888	208,064	195,580	149,388	140,425	79,780	74,993		
1889	181,609	169,986	148,517	139,012	53,192	49,787		
1890	158,715	166,066	171,545	179,436	70,427	73,666		
1891	225,633	222,926	185,584	183,357	3,306	3,266		
1892	41,581	36,425	191,910	168,113	77,160	67,592		
1893		8,689		126,439		195,000		
1894			101,318	63,830	746,379	470,219		
1895			81,753	53,369	1,496,522	976,930		
1896			70,000	46,942	3,135,343	2,102,561		
1897	5,000	2,990	80,475	48,116	5,472,971	3,272,289		
1898	85,000	49,521	74,932	43,655	4,292,401	2,500,753		
1899	202,000	120,352	40,231	23,970	2,939,413	1,751,302	230,000	137,034
1900	161,650	99,140	58,400	35,817	3,958,175	2,427,548	290,000	177,857
1901	151,400	89,250	41,459	24,440	5,151,333	3,036,711	195,000	114,953
1902	145,000	75,632	42,500	22,168	3,917,917	2,043,586	185,900	96,985
1903	17,777	9,502	28,600	15,287	2,996,204	1,601,471	156,000	83,362
1904	206,875	118,376	15,000	8,583	3,222,481	1,843,935	133,170	76,201
1905	2,451,356	1,479,442	19,620	11,841	3,439,417	2,075,757	89,630	54,093
1906	5,401,766	3,607,894	17,686	11,813	2,990,262	1,997,226	63,665	42,522
1907	9,982,363	6,521,178	16,000	10,452	2,745,448	1,793,519	35,988	23,510
1908	19,398,545	10,254,847	13,299	7,030	2,631,389	1,391,058	63,000	33,304
1909	24,822,099	12,784,126	13,233	6,815	2,649,141	1,364,387	45,000	23,176
1910	30,366,366	16,241,755	7,593	4,061	2,407,887	1,287,883	87,418	46,756
1911	30,540,754	16,279,443	18,435	9,827	1,887,147	1,005,924	112,708	60,078
1912	29,214,025	17,772,352	9,465	5,758	2,651,002	1,612,737	81,068	49,318
1913	28,411,261	16,987,377	34,573	20,672	3,312,343	1,980,483	87,626	52,392
1914	25,139,214	13,779,055	57,737	31,646	3,159,897	1,731,971	92,973	50,959
1915	22,748,609	11,302,419	63,450	31,524	3,565,852	1,771,658	248,049	123,241
1916	21,608,158	14,188,133	98,610	64,748	3,392,872	2,227,794	360,101	236,446
1917	19,301,835	15,714,975	136,194	110,885	2,655,994	2,162,430	119,605	97,379
1918	17,198,737	16,643,562	178,675	127,907	3,921,336	3,794,755	71,915	69,594
1919	12,117,878	13,465,628	140,926	156,600	3,713,537	4,126,556	27,556	30,621
1920	9,907,626	9,996,795	61,003	61,552	3,327,028	3,356,971	19,190	19,363
1921	9,761,607	6,116,037	38,084	23,861	3,350,357	2,099,133	393,092	246,288
1922	10,811,903	7,300,305			7,150,937	4,828,384	663,493	447,997
Grand total	331,161,901	211,986,012	2,553,093	2,208,617	96,582,540	63,117,536	3,852,147	2,393,429

*Does not include small productions from New Brunswick, Alberta, and Manitoba, in 1917, and from Manitoba from 1918 to 1922.

Important quantities of silver are being produced in Canada, both as fine metal and as bullion. Fine silver is produced at Trail, B.C., by the Consolidated Mining and Smelting Company of Canada, Limited, chiefly from the silver-lead ores, and in recent years from the copper-gold-silver ores of the province, and finds a market in Canada, the United States and China.

In Ontario, ores from the Cobalt district are treated by the Coniagas Reduction Company, Thorold, Ont.; the Deloro Smelting and Refining Company, Deloro, Ont.; the Ontario Smelters and Refiners, Ltd., with plants at Welland, Ont. Silver bullion varying in fineness from 850 to 998.2 is produced at these works, other products being white arsenic, metallic nickel and cobalt, nickel and cobalt oxides and salts of nickel and cobalt.

The silver bullion from Ontario as a rule finds a market in the United States and England, but important quantities are also shipped to the Orient.

Prices.—The monthly average during 1922 of the New York prices for silver which was 65.540 cents per ounce in January rose to 71.154 cents in May and then gradually declined until in December, the average quotation was 63.805 cents. For the twelve months the average was 67.528 cents as against 62.654 cents in 1921.

The most important silver-producing countries in the world are, in order of importance, Mexico, United States, Canada and Peru, which accounted for 80.6 per cent of the total world's production in 1922. In all these countries important increases in production have been recorded and with the exception of United States, all the silver produced has been marketed at the above rates. In the United States the production was stimulated by the price of \$1 per ounce, fixed by the Pittman Act. After the purchases during the year under this Act there remained a quantity in the neighbourhood of 60,000,000 ounces still to be purchased and it was expected that this would be completed in the year 1923.

Table 81.—Monthly Average Prices of Silver*, 1920, 1921 and 1922

	New York Cents per fine Ounce			London Pence per Standard Ounce		
	1920	1921	1922	1920	1921	1922
January.....	132.827	65.950	65.450	79.846	39.985	35.035
February.....	151.295	59.233	65.290	85.005	34.745	33.891
March.....	125.551	56.023	64.440	74.194	32.479	33.269
April.....	119.779	59.337	66.575	68.848	34.250	34.080
May.....	102.585	59.810	71.154	60.010	34.165	36.023
June.....	90.957	58.510	71.149	51.096	34.971	35.900
July.....	91.921	60.260	70.245	53.736	37.481	35.644
August.....	96.168	61.597	69.417	59.875	38.096	34.957
September.....	93.675	66.160	69.515	59.476	40.082	35.305
October.....	83.480	70.970	68.015	54.197	41.442	34.498
November.....	77.734	68.234	65.177	50.952	38.750	32.882
December.....	64.774	65.760	63.905	41.845	35.645	31.383
Average.....	100.900	62.654	67.528	61.590	36.841	34.406

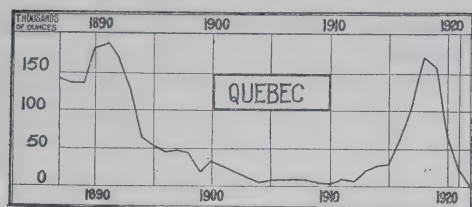
*From the "Engineering Mining Journal-Press."

Table 82.—Exports from Canada and Imports of Silver, 1920, 1921 and 1922

	1920	1921	1922
	\$	\$	\$
EXPORTS—			
In ore, concentrates, bullion.....	12,238,209	7,202,663	11,684,028
IMPORTS—			
Silver—			
Bullion in bars and blocks.....	2,453,450	581,861	657,760
Coins.....	100	2,083	
Sterling.....	314,869	174,788	178,223
Manufacture of gold and silver—			
Leaf.....	108,788	47,123	63,276
Sweepings.....	6,605	2,771	5,471
Manufactures, n.o.p.....	184,681	97,110	89,684
Electroplated ware.....	545,015	387,974	442,593

QUEBEC

The small quantity of silver credited in former years to Quebec province represented the



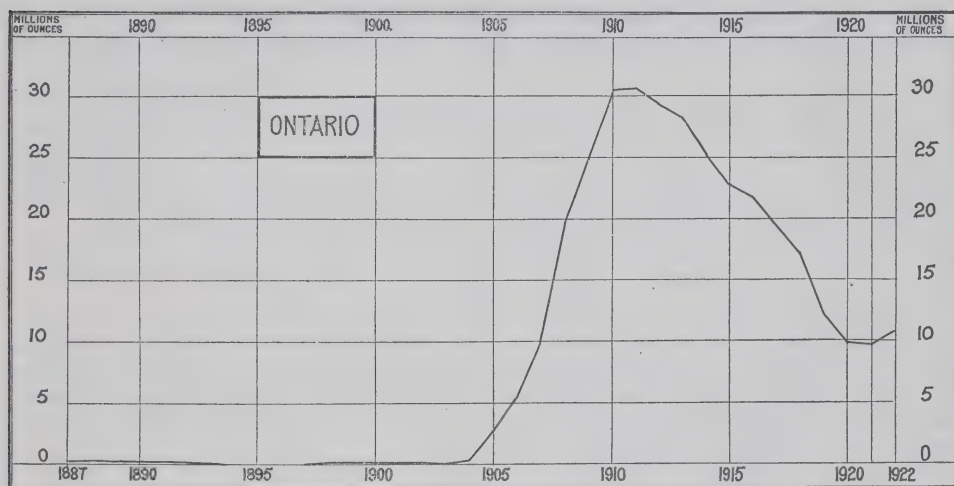
silver recovery from the pyritic ores mined at Eustis and Weedon in the eastern townships, and the lead-zinc ores of Notre-Dame-des-Anges, Portneuf County. In 1921, the production was 38,084 fine ounces valued at \$23,861 but since the above-mentioned properties were all idle in 1922, no production was recorded.

ONTARIO

The production of silver in Ontario in 1922 was 10,811,903 fine ounces valued at \$7,300,305 as against 9,761,607 fine ounces valued at \$6,116,037 in 1921. The total for 1922 includes an adjustment of 1,222,450 fine ounces valued at \$825,410, which has been entered in order to take account of the stocks of silver bullion on hand at the end of 1921, as mentioned in the special note at the beginning of this section. On this basis the increase of the production of silver in 1922 compared with 1921 was 1,050,296 ounces or 10.7 per cent, and the increase in value was \$1,184,268 or 19.4 per cent.

The production in Ontario reached its highest point in 1911 in which year over thirty million ounces were produced from the rich high-grade ores of Cobalt. Since that period the production has gradually decreased to a point around ten million ounces annually.

PRODUCTION OF SILVER IN ONTARIO, (1887-1922).



During 1922 a total of (a) 8,043,136 ounces or 74.4 per cent of the total Ontario production was produced as bullion in the Cobalt district; (b) 1,914,348 ounces or 17.7 per cent was recovered by the silver smelters of southern Ontario; and (c) 177,077 ounces or 1.6 per cent was contained in gold bullion and nickel refineries leaving a balance of (d) 677,342 ounces or 6.3 per cent recovered from Ontario ores and slags treated in the United States.

The corresponding figures for the year 1921 were (a) 5,060,454 ounces or 51.8 per cent; (b) 3,884,683 ounces or 39.8 per cent; (c) 120,336 ounces or 1.3 per cent and (d) 683,586 ounces or 7.1 per cent.

As indicated above, practically the whole Ontario silver production is derived from the Cobalt ores with which is included the silver produced by the nickel refineries and that contained in gold bullion. The recovery during the year from these sources was as follows: silver contained in gold bullion, 163,622 ounces as against 120,336 ounces in 1921; silver produced by the refineries of the International Nickel Company and the British America Nickel Corporation 13,455 ounces in 1922 as against 8,818 ounces in 1921.

The following table shows the percentage of production from the Cobalt Camp, the south Ontario smelters, and from ores exported to the United States.

Table 83.—Percentage of Silver Production Credited to each Group Treating Ontario Ores, 1914-1922

Producing Group	1914	1915	1916	1917	1918	1919	1920	1921	1922
	%	%	%	%	%	%	%	%	%
Cobalt district.....	41.0	41.0	39.5	51.1	55.0	48.7	58.6	51.8	74.4
Ontario smelters.....	36.0	43.0	44.7	33.9	29.0	36.4	33.7	41.1	19.3
Total for Ontario.....	77.0	84.0	84.2	85.0	84.0	85.1	92.3	92.9	93.7
U.S. smelters.....	23.0	16.0	15.8	15.0	16.0	14.9	7.7	7.1	6.3
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

MANITOBA

The silver production in Manitoba has been derived from the gold and copper ores of The Pas District. During the war several copper deposits were developed and in 1918, 1919 and 1920 considerable tonnages of copper ore were shipped from the Mandy Mine to Trail, B.C. The ore carried considerable silver and in the three years mentioned almost 50,000 ounces was produced. With the drop in the price of copper and the high freight rates no shipments of copper ores have been made, with the result that the production of silver has practically ceased. The historical record is shown below.

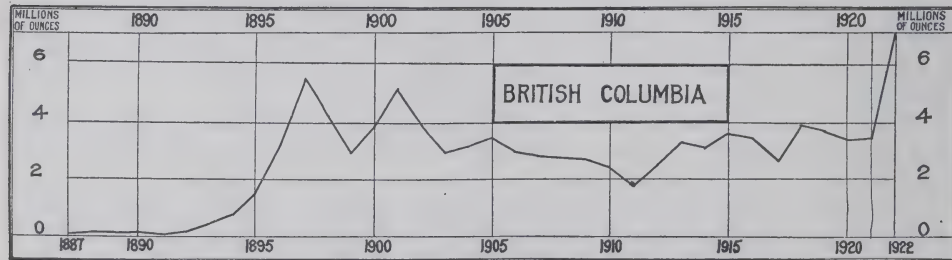
Table 84.—Production of Silver in Manitoba, 1918-1922

	Fine Ounces	Value
		\$
1918.....	13,316	12,886
1919.....	20,700	23,069
1920.....	15,510	15,649
1921.....	33	20
1922.....	20	14

BRITISH COLUMBIA

The chief sources of the silver production in British Columbia have been the silver-lead-zinc ores of the East and West Kootenays supplemented by the silver contained in the gold-copper ores of Rossland and the Boundary and Coast districts. During the last two years this production has been remarkably increased by the shipments of rich ores from the Premier mine near Stewart and the Dolly Varden Mines at Alice Arm.

PRODUCTION OF SILVER IN BRITISH COLUMBIA, (1887-1922).



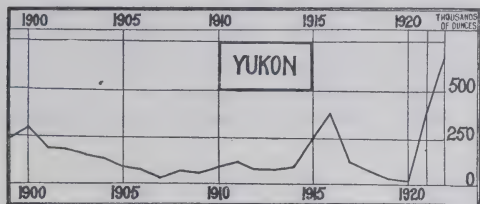
As shown in Table 80 the production in 1922 amounted to 7,150,937 fine ounces valued at \$4,828,384 as against 3,350,357 fine ounces valued at \$2,099,133 in 1921.

The production in 1922 included: (a) contained in blister copper 1,139,916 ounces or 15.9 per cent; (b) contained in lead bullion 2,362,451 ounces or 33.1 per cent; (c) in lead and zinc ores and concentrates exported 123,192 ounces or 1.7 per cent and (d) in gold, silver and copper ores exported 3,525,378 ounces or 49.3 per cent.

The corresponding figures for 1921 were (a) 549,596 ounces or 16.5 per cent (b) 1,090,643 ounces or 32.5 per cent; (c) 151,234 ounces or 4.5 per cent; and (d) 1,558,528 ounces or 46.5 per cent.

YUKON TERRITORY

The development and shipments of the rich argentiferous lead ores of the Keno Hill district accounted for the increase in the production of silver in Yukon Territory. In the year 1900 as shown in Table 80 when placer gold had reached its maximum output, the silver content amounted to about 290,000 ounces.



From that year until the discovery of the silver-bearing lead ores the production gradually decreased. During 1922 the output amounted to 663,493 ounces valued at \$447,997 as against 393,092 ounces valued at \$246,288 in 1921. The production which has almost been doubled was the highest yet recorded and was mainly due to the activities of the mines in the Keno Hill area.

The quantity of silver from placer gold is gradually decreasing; in 1922 it was only 12,233 fine ounces as against 14,831 fine ounces in 1921. The respective percentages of silver won from lode or placer mining were 98.2 per cent and 1.8 per cent in 1922 as against 96.2 per cent and 3.8 per cent in 1921.

The following table gives these percentages from 1916 to 1922. During the period 1918 to 1920 the silver-lead shipments had fallen off.

Table 85.—Percentage of the Silver Output in the Yukon won from Lode and Placer Mining, 1916-1922

	From Lode Mining	From Placer Mining
	%	%
1916.....	87.0	13.0
1917.....	66.8	33.2
1918.....	68.2	31.8
1919.....	26.0	74.0
1920.....	14.6	85.4
1921.....	96.2	3.8
1922.....	98.2	1.8

On an average about one ounce of silver is contained in each five ounces of crude bullion from alluvial workings.

Table 86.—World's Production of Silver, 1913, 1918-1922

(As reported in 1922 Year Book of the "American Bureau of Metal Statistics,"*)

(Fine ounces)

Country	1913	1918	1919	1920	1921	1922
NORTH AMERICA—						
United States.....	66,801,500	67,810,100	56,682,445	55,361,573	53,727,891	55,489,000
Canada.....	31,524,708	21,383,979	16,020,657	13,330,357	13,004,546	17,611,646
Mexico.....	55,486,431	62,517,000	65,904,224	66,516,354	64,465,347	81,076,899
Total North America.....	153,812,639	151,711,079	138,607,326	135,208,284	131,197,784	154,157,545
Central America and West Indies..	2,135,641	2,900,000	2,800,000	2,700,000	2,000,000	2,500,000
SOUTH AMERICA—						
Argentina.....	35,271	25,000	25,000	30,000	25,000	*25,000
Bolivia and Chile.....	3,932,594	4,335,000	4,335,000	4,828,086	5,000,000	*5,000,000
Brazil.....	28,364	25,000	25,000	30,000	33,000	*33,000
Colombia.....	587,683	494,331	494,331	480,000	500,000	*500,000
Ecuador.....	22,642	40,000	40,000	35,000	40,000	*40,000
Peru.....	9,617,094	9,781,734	9,821,729	9,196,282	9,853,910	12,100,000
Other countries.....	51,111	11,000	12,100	12,000	13,700	*14,000
Total South America.....	14,274,759	14,712,065	14,753,160	14,611,368	15,465,610	17,712,000
EUROPE—						
Austria-Hungary.....	2,104,107	1,750,000	15,432	13,985	15,000	.....
France.....	1,005,266	272,278	164,222	321,500	321,500	.....
Czecho-Slovakia.....	.....	554,780	580,918	680,069	703,056	.....
Great Britain.....	128,543	79,636	68,415	76,344	12,229	.....
Germany.....	6,182,445	5,259,740	3,475,415	3,305,020	3,375,750	.....
Greece.....	803,750	175,015	160,000	220,935	192,900	.....
Italy.....	423,888	500,000	300,000	297,452	219,392	.....
Norway.....	300,602	312,016	341,433	323,172	202,115	.....
Portugal.....	205,822	.....	.....	.....	.....	.....
Russia.....	.....	400,000	400,000	50,000	40,000	.....
Serbia.....	28,758	20,000	20,000	15,000	15,946	.....
Spain.....	4,031,417	3,182,464	2,666,232	2,956,546	2,679,349	.....
Sweden.....	33,839	31,500	20,576	22,569	30,000	.....
Turkey.....	1,509,133	400,000	100,000	100,000	100,000	.....
Total Europe.....	16,757,070	12,937,429	8,312,643	8,382,592	7,907,237	*9,000,000
AUSTRALASIA—						
New South Wales.....	14,504,889	9,259,961	6,304,818	675,332	4,241,890	.....
Queensland.....	604,979	152,499	92,048	274,235	195,328	.....
Victoria.....	16,195	6,333	6,121	6,231	5,204	.....
New Zealand.....	975,616	879,383	453,561	454,000	454,000	.....
Tasmania.....	765,187	294,396	525,343	623,359	348,658	.....
Other states.....	190,680	111,438	223,893	131,697	117,600	.....
Total Australasia.....	17,057,546	10,704,010	7,605,784	2,164,854	5,362,680	12,000,000
ASIA—						
India.....	125,209	1,971,783	2,165,606	2,906,397	3,587,587	4,250,000
China.....	.....	70,000	65,000	50,000	40,000	*40,000
Chosen (Korea).....	15,048	26,000	20,000	1,200	1,000	*1,000
Dutch East Indies.....	465,980	1,286,000	1,006,842	1,027,956	1,021,994	*1,000,000
Japan.....	4,700,390	6,596,618	5,160,070	4,889,540	4,185,504	3,886,301
Other countries.....	51,763	27,900	32,269	25,179	18,437	*18,400
Total Asia.....	5,358,390	9,978,301	8,449,787	8,900,272	8,854,522	9,195,701
AFRICA—						
Algeria.....	.....	170,813	170,813	150,000	150,000	*150,000
Belgian Congo.....	1,454	10,500	10,000	10,674	5,819	*6,000
Rhodesia.....	121,537	175,722	180,591	164,865	161,353	178,000
Transvaal, Cape Colony and Natal.....	952,928	877,500	891,304	892,593	890,329	1,200,000
Other Countries.....	.....	21,980	18,986	15,116	13,362	*14,000
Total Africa.....	1,075,919	1,256,515	1,271,694	1,233,248	1,160,393	1,548,000
Grand Total.....	210,471,964	204,199,399	181,800,394	173,200,618	171,948,726	206,113,246

*Note.—The basis of this table is the information published by the Director of the Mint. However revisions and additions have been made so that the totals do not agree with the Mint Figures. For 1922 the figures are based on actual reports or reliable estimates, except where the asterisk is used indicating that the figure is conjectural.

TIN

Tin ores have not yet been found in sufficient quantities in Canada to be of economic importance.

The occurrence of tin ore has been reported from several localities, the most important perhaps being the discovery of cassiterite, near New Ross, Lunenburg county, N.S. Reports upon it may be found in the Summary Reports of the Geological Survey Branch of the Department of mines for 1907, 1908, 1910, 1911, and 1912.

Cassiterite occurs in a few scattered crystals in pegmatite dykes in the drainage basin of McDougal creek, Lardeau division, B.C., and it has been found also in black sands in the Atlin district, B.C., and in the alluvial sands of Dublin gulch, Mayo district, Y.T.

The occurrence of tin has been noted in some bodies of sulphide minerals found in the vicinity of West Hawk and Star lakes, near the boundary line between Ontario and Manitoba. Attention is called to these occurrences not on account of their commercial importance, but for the interesting manner of occurrence and the mineral associations.

Ores of tin were formerly imported from South America and reduced in Canada by the Electro Tin Products Company of Brantford, Ontario. The plant comprised roasting furnaces, electric smelting and slag-cleaning furnaces.

Table 87.—Imports of Tin into Canada, 1920, 1921 and 1922

Item	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$.		\$		\$
Tin in blocks, pigs and bars.....	4,801,000	3,029,964	2,566,600	840,278	36,818	1,165,532
Tin foil.....	1,834,220	513,688	1,391,011	330,630	2,110,215	467,246
Strip waste.....	128,120	5,082	19,098	469	11,875	247
Collapsible tubes.....		122,339		73,070		22,903
Tinware, etc. (a).....		932,398		481,087		485,807
Tin, crystals.....		(b)		(b)		(b)
Bichloride of tin.....	51,098	24,261	25,015	6,915	36,258	9,143
Total.....		4,627,732		1,732,449		2,150,878

(a) Tinware, plain, japanned or lithographed, and all manufactures of tin, n.e.s.

(b) Included with "Bichloride of Tin."

ZINC

The production of zinc in the refined state at Trail, B.C. during 1922 accounted for the whole Canadian production and amounted to 56,290,000 pounds or 28,145 tons which at the average St. Louis price of 5.716 cents per pound was valued at \$3,217,536. During the year no mine operators reported having shipped zinc ores to the United States.

In 1921, the production was 53,089,356 pounds or 26,544.6 tons valued at \$2,471,310 or 4.655 cents per pound on the St. Louis market. The output included 52,988,000 pounds of refined zinc produced at Trail, B.C., and 101,356 pounds, estimated as recovered from ores and concentrates exported.

The increase in 1922 amounted to 6 per cent in quantity and 30 per cent in value.

Small shipments of zinc concentrates were formerly made from Galetta, Ont., and the lead-zinc mines of Notre Dame des Anges, Quebec, also accounted for a small production, part of which was used in the manufacture of zinc oxide and part exported to the United States for treatment. The oxide plant operated in Quebec was destroyed by fire in 1920, and neither of these localities reported any shipments of zinc concentrates in 1920, 1921 or 1922.

With the exception of a small production in experimental work there was no recovery of zinc spelter or refined zinc in Canada prior to 1916. The production of zinc was therefore recorded in terms of the tonnage of ore shipped and its metal contents. The establishment of an electrolytic refinery at Trail placed the metallurgy of this metal in Canada on a similar basis to that of lead and copper and its production has since been recorded in the same way.

The production of zinc-bearing ores in British Columbia during 1922 received an impetus in the new tariff of smelter rates offered by the Consolidated Mining and Smelting Company at Trail. Although not paid for by the United States smelters, the lead in ore is considered as dutiable and as there is often a small lead content in the zinc ore or concentrates shipped, the lead duty applies. Whereas formerly these zinc ores were shipped at heavy cost to the United States and the producers suffered from the handicap of high freight rates, penalties and customs duties, the schedule now offered at Trail makes it possible for operators to have their zinc ores and concentrates treated in Canada. The opening up of this market and the resulting saving in freights and duties was reflected in the increase in shipments made during 1922 from the lead-zinc mines of the province.

PRODUCTION OF ZINC IN CANADA 1911-1922

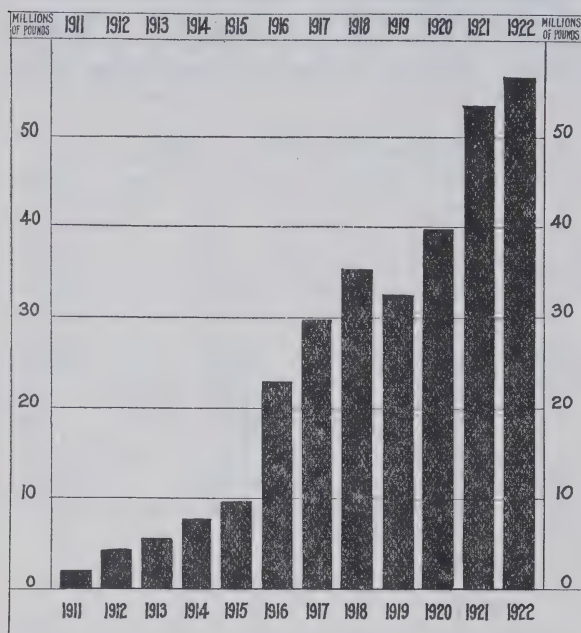


Table 88.—Production of Zinc in Canada, 1911-1922

Year	*Pounds	Total Value	Average price per pound
		\$	Cents
1911.....	1,877,479	108,105	5.758
1912.....	4,283,760	297,421	6.943
1913.....	5,640,195	318,558	5.648
1914.....	7,246,063	377,737	5.213
1915.....	9,771,651	1,292,789	13.230
1916.....	23,364,760	2,991,623	12.804
1917.....	29,668,764	2,640,817	8.901
1918.....	35,083,175	2,862,436	8.159
1919.....	32,194,707	2,362,448	7.338
1920.....	39,863,912	3,057,961	7.671
1921.....	53,089,356	2,471,310	4.655
1922.....	56,290,000	3,217,536	5.716

*Estimated smelter recoveries, including for years 1916 to 1922 the actual zinc recovered at Trail, B.C.

Table 89.—Production of Refined Zinc at Trail, B.C., 1916-1922

Year	Short tons
1916.....	2,974
1917.....	9,985
1918.....	12,574
1919.....	12,326
1920.....	18,517
1921.....	26,494
1922.....	28,145
Total.....	111,015

The United States tariff of 1913 under which zinc ore containing 25 per cent or more of zinc was dutiable to the extent of 10 per cent on the zinc contained therein was changed on September 21, 1922, as follows:

"Zinc-bearing ore of all kinds, containing less than 10 per centum of zinc, shall be admitted free of duty; containing 10 per centum or more of zinc and less than 20 per centum, one-half of 1 cent per pound on the zinc contained therein; containing 25 per centum of zinc or more, 1½ cents per pound on the zinc contained therein."

There was also a duty of 15 per cent on metallic zinc imported into the United States, which is now changed under the new tariff as follows:

"Zinc in blocks, pigs, or slabs, and zinc dust, 1¾ cents per pound; in sheets, 2 cents per pound; in sheets coated or plated with nickel or other metal (except gold, silver, or platinum), or solutions, 2¼ cents per pound; old and worn-out, fit only to be remanufactured, 1½ cents per pound."

Prices.—The price of zinc in St. Louis averaged 5.716 cents per pound for the year 1922 as against 4.655 cents in 1921. There was a gradual rise in price throughout the whole of 1922 commencing in January at 4.691 cents, and quotations rose to their highest point, 7.10 cents in November. The New York prices are generally a fraction of a cent higher per pound corresponding to the difference in freight rates. The Canadian market is centered in Montreal and Toronto.

to which the Consolidated Mining and Smelting Company is the most important shipper. The average monthly price of zinc in the Montreal market during January, 1922 was 6·561 cents per pound and in May rose to 6·809 cents. This point was never passed and the price closed in December at 6·673 cents per pound. Throughout the twelve months the variations in prices were less in Montreal than on the St. Louis market. The average price for the year in Montreal was 7·210 cents per pound.

Table 90.—Monthly Average Prices of Zinc (Spelter), 1920, 1921 and 1922

Month	Montreal (In cents per pound)			St. Louis (In cents per pound)			Ordinary Brands, in London, (Per long ton)		
	1920	1921	1922	1920	1921	1922	1920	1921	1922
							£ s. d.	£ s. d.	£ s. d.
January.....	11-284	6-561	6-472	9-483	5-413	4-691	59 10 4	25 15 7	26 6 5
February.....	11-275	6-607	6-211	9-058	4-928	4-485	62 3 7	25 5 5	24 4 3
March.....	9-856	6-686	6-288	8-881	4-737	4-658	54 16 8	25 10 5	25 9 4
April.....	10-279	6-588	6-531	8-534	4-747	4-906	48 9 5	26 1 6	26 11 6
May.....	9-812	6-809	6-691	7-938	4-848	5-110	46 0 9	27 6 7	27 6 0
June.....	9-817	6-556	6-906	7-815	4-421	5-346	42 2 11	27 2 2	27 17 10
July.....	10-085	6-311	7-274	8-070	4-239	5-694	42 13 4	26 12 0	29 0 10
August.....	10-113	6-126	7-734	8-185	4-186	6-212	41 19 6	25 8 1	31 3 4
September.....	9-239	6-190	7-864	7-717	4-235	6-548	40 5 6	25 10 8	31 15 0
October.....	8-410	6-454	7-274	*	4-605	6-840	40 5 6	26 10 8	34 10 6
November.....	7-759	6-550	8-639	*	4-665	7-104	35 14 8	26 4 10	38 0 2
December.....	6-769	6-673	8-637	*	4-837	6-999	28 11 6	27 0 11	37 15 1
Average.....	9-558	6-509	7-210	7-671	4-655	5-716	45 4 6	26 4 1	30 0 0

*No quotations for last three months 1920.

Imports and Exports.—Lead importations into Canada have fallen off since 1920 as production from Canadian smelters has increased. In the case of zinc, while Canadian production has materially increased, the excess production appears to have gone into the export trade, for the imports of zinc and zinc products unlike the imports of lead have apparently recovered from the slump of 1921 and are now greater than those for the year 1920. The figures for the imports were 27,922,351 pounds in 1922 as against 27,272,102 pounds in 1920. During 1921, only 17,386,277 pounds of zinc and zinc products was imported. The exports of zinc spelter in 1922 were more than seven times greater than the exports in 1920, while the exports in 1921 were not quite four times greater.

In addition to data on zinc and zinc products, imports of brass and brass manufactures are also given. Brass usually contains about 30 per cent of zinc. Where possible the zinc content is shown of all zinc and brass products.

Table 91.—Imports into Canada and Exports of Zinc and Brass, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
IMPORTS						
Zinc and Zinc Products—						
Zinc, in blocks, pigs and sheets.....	3,452,892	410,772	2,783,001	247,475	3,897,090	299,995
Zinc, as spelter.....	1,555,068	122,745	1,110,844	56,683	1,060,283	67,737
Zinc white (80% Zn.).....	21,254,272	1,829,620	12,751,203	886,784	22,065,276	1,338,568
Zinc dust (90% Zn.).....	378,556	50,597	434,981	46,440	313,652	27,390
Zinc, sulphate and chloride of (44% Zn.)..	631,314	44,471	306,248	17,944	586,050	27,285
Total.....	27,272,102	2,458,205	17,386,277	1,255,326	27,922,351	1,760,975
Zinc, manufactures of.....		96,961		53,946		78,398
Grand total.....		2,555,166		1,309,272		1,839,373
Brass and Brass Products—						
Brass, in blocks, pigs and ingots(30%Zn.)..	360,400	72,451	120,600	16,860	185,400	21,671
Brass, old and scrap (30% Zn.).....	3,538,700	533,534	5,362,900	289,724	2,200,000	221,378
Brass, tubing (30%Zn.).....	1,076,278	400,149	735,302	194,794	1,410,141	321,074
Brass, plain wire (30% Zn.).....	259,957	90,987	235,906	64,125	551,081	117,496
Total.....	5,235,335	1,097,121	6,454,708	565,503	4,346,622	681,619
Brass, bars and rods.....	2,267,400	525,235	723,500	135,750	1,842,900	268,659
Brass, strips, sheets or plates.....	1,482,200	431,236	1,170,200	259,844	1,515,300	276,361
Brass, wire cloth, n.o.p.....		485,198		345,327		317,290
Brass, cup for manufacture of shells.....		247,698		75,348		63,281
Brass, caps for electric batteries.....		7,508		5,073		4,743
Brass, hand-pumps.....		22,258		21,081		28,091
Brass, nails, tacks, etc.....		9,050		2,044		2,666
Brass and copper rivets, burrs and washers..		35,789		39,373		27,716
Brass, valves.....		562,153		186,036		164,014
Brass, other manufactures, n.o.p.....		2,914,529		1,886,123		1,722,345
Carburetors of brass.....						278,002
Total.....		5,240,654		2,955,999		3,153,198
*Grand total.....		6,337,775		3,521,502		3,834,817
EXPORTS						
Zinc—						
Ore.....Tons	3,126	122,387	52	1,293	40	1,095
Spelter.....“	3,490	512,279	12,828	1,336,389	28,518	3,054,644
Brass—						
Old and scrap.....Lb.	3,439,800	475,809	2,096,700	126,832	6,726,500	459,846
Rods, sheets and tubing.....“	244,000	49,728	9,300	2,393	400	74
Valves.....		325,794		156,804		150,953
Mfrs. of brass, n.o.p.....				12,222		38,753

*“Nails and tacks” also “Rivets, burrs and washers” of brass and copper are covered by one combined item, which appears, in Trade Reports, under “Miscellaneous Non-Ferrous Metals.” As they are included in the above list, this total of “Brass” will not agree with totals appearing in reports of the External Trade Branch.

Table 92.—World's Production of Zinc, 1913, 1918-1922
(Compiled from the 1922 Year Book of the “American Bureau of Metal Statistics.”)
(Short Tons)

Country	1913	1918	1919	1920	1921	1922
United States.....	352,952	525,217	471,556	479,772	215,614	373,678
Canada.....		12,571	12,323	18,508	26,494	27,782
Belgium.....	225,050	10,188	21,886	92,880	72,917	124,710
France.....	74,815	20,218	11,902	21,659	33,069	41,887
Germany (including Silesia).....	307,238	189,434	93,670	107,406	99,207	116,293
Great Britain.....	73,000	42,979	42,126	27,550	6,515	20,529
Italy.....		1,299	1,413	1,297	427	2,901
Austria-Hungary.....	23,921	13,224				
Jugo-Slavia and Czecho-Slovakia.....			4,419	6,612	6,614	9,921
Netherlands.....	26,804	750		2,238	7,060	14,327
Norway.....	10,234	2,044	3,731	2,024	2,205	2,039
Poland (excluding Silesia).....	8,398	5,392	4,868	5,909	7,745	10,141
Spain.....	3,650	11,020	11,031	6,469	6,614	5,512
Sweden.....	2,204	4,753	2,648	6,458	3,858	2,094
Australia.....	4,614	10,023	9,128	10,825	1,883	26,447
Japan.....	992	43,979	21,837	17,356	11,435	11,023
Total.....	1,113,872	893,091	712,538	806,963	501,657	789,284

NON-METALLICS

ABRASIVES

Corundum.—Corundum is found in an area embracing several townships in Renfrew and Hastings counties, in the province of Ontario. The industry made its appearance there in 1900, the production reaching a maximum in 1906. From 1907 to 1913 the yearly production was smaller, but fairly uniform. Operations were indefinitely suspended during August, 1918, but were renewed again in 1919, since which time old tailings have been treated for the recovery of grain corundum.

No shipments of grain corundum were reported during 1922. In the previous year, 403 tons of grain corundum valued at \$55,965 was exported to the United States.

Table 93.—Production of Corundum in Canada, 1900-1922

(Short Tons)

Year	Corundum-bearing rock treated	Grain Corundum graded	Per Cent Recovery	Shipments of Grain Corundum				Average price cents per pound
				Sold in Canada	Exported	Total Shipments	Total Value	
	tons	tons		tons	tons	tons	\$	
1900.....		60				3	300	5.00
1901.....	4,134	434	10.7	85	302	387	46,415	5.97
1902.....	7,996	805	10.1	106	662	768	84,465	5.49
1903.....	(a) 8,877	839	9.5	85	618	703	77,510	5.51
1904.....	28,187	1,654	5.9	116	877	993	109,545	5.51
1905.....	23,571	1,681	7.1	140	1,504	1,644	149,153	4.48
1906.....	45,719	2,914	6.4	162	2,112	2,274	204,973	4.50
1907.....	60,532	2,682	4.4	164	1,728	1,892	177,922	4.70
1908.....	2,678	106	4.0	99	990	1,089	100,398	4.60
1909.....	35,894	1,579	4.4	129	1,362	1,491	162,492	5.45
1910.....	37,183	1,686	4.5	106	1,764	1,870	198,680	5.31
1911.....	41,975	1,641	3.9	92	1,380	1,472	161,873	5.50
1912.....	36,879	1,620	4.4	63	1,897	1,960	239,091	6.10
1913.....	12,290	763	6.2	23	1,154	1,177	137,036	5.82
1914.....	12,111	695	5.7	14	534	548	72,176	6.59
1915.....	1,724	116	6.7	21	240	262	33,138	6.33
1916.....	1,864	67	3.6	8	59	67	10,307	7.65
1917.....	4,659	188	4.0	16	172	188	32,153	8.55
1918.....	3,184	137	4.3	0	137	137	26,112	9.90
1919.....	(b) 1,300	26	2.0	0	0	0	0	0.0
1920.....	13,025	322	2.5	0	176	196	24,547	6.25
1921.....	(b) 11,256	407	3.6	0	403	403	55,965	6.94
1922.....								
Total.....	395,038	29,422		1,449	18,071	19,524	2,104,251	

(a) In addition to this amount which was milled in Canada, 267 tons of ore was mined and shipped to the United States for treatment there.

(b) Tailings only.

Grindstones, Pulpstones and Scythstones.—The production of grindstones, pulpstones and scythstones in Canada in 1922 amounted to 1,005 tons valued at \$43,742. Of this quantity, quarries in New Brunswick accounted for 903 tons, while Nova Scotia contributed the balance or 102 tons. In 1921, sales totalled 1,281 tons valued at \$64,067.

Table 94.—Production in Canada, Imports and Exports of Grindstones, 1920, 1921 and 1922

		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
			\$		\$		\$
PRODUCTION—							
Nova Scotia.....	Tons	211	8,440	183	6,990	102	3,692
New Brunswick.....	"	2,233	79,696	1,098	57,077	903	40,050
Total.....		2,444	88,136	1,281	64,067	1,005	43,742
IMPORTS—							
Grindstones.....			312,672		448,055		319,941
Burrstones in blocks, etc.....	No.	343	1,655	668	4,844	400	910
Emery in bulk, crushed or ground.....			69,462		44,490		41,943
Emery and carborundum wheels and manufactures.....			471,853		197,049		209,356
Pumice and pumice stone ground.....			57,068		21,528		26,405
Iron sand or globules for polishing and sawing.....			17,009		13,723		11,820
Sandpaper, emery paper, etc.....			560,180		252,804		270,231
Artificial abrasives.....			251,260		74,083		163,542
EXPORTS—							
Grindstones, manufactured.....			41,705		24,915		17,018
Stone for the manufacture of grindstones.....	Tons			91	2,686		
Abrasives—							
Natural, n.o.p.....	Cwt.	81,330	236,569	34,285	83,773	52,752	128,934
Artificial, crude, including carborundum.....	Cwt.	598,664	1,579,508	139,146	522,531	266,526	1,299,818
Artificial, made up into wheels, stones, etc.....			41,138		18,752		14,650

Table 95.—Production of Grindstones in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value
		\$			\$
1886.....	4,020	46,545	1906.....	5,363	59,814
1887.....	5,292	64,008	1907.....	5,414	60,376
1888.....	5,764	51,129	1908.....	3,843	48,128
1889.....	3,404	30,863	1909.....	4,275	54,664
1890.....	4,884	42,340	1910.....	3,973	47,196
1891.....	4,479	42,587	1911.....	4,566	52,942
1892.....	5,283	51,187	1912.....	4,412	52,000
1893.....	4,600	38,379	1913.....	4,837	51,325
1894.....	3,757	32,717	1914.....	3,976	54,504
1895.....	3,475	31,932	1915.....	2,580	35,768
1896.....	3,713	33,310	1916.....	3,478	52,782
1897.....	4,572	42,340	1917.....	2,523	45,754
1898.....	4,935	44,775	1918.....	3,072	33,005
1899.....	4,511	43,265	1919.....	2,020	60,516
1900.....	5,539	53,450	1920.....	2,444	88,136
1901.....	4,581	45,690	1921.....	1,281	64,067
1902.....	4,633	44,118	1922.....	1,005	43,742
1903.....	5,538	48,302	Total.....		152,231
1904.....	4,649	42,782			
1905.....	5,540	62,375			

Tripolite.—Shipments of tripolite in 1922 amounted to 219 tons valued at \$5,871 as against 341 tons at \$11,268 in the previous twelve months.

Tripolite is a silicious material closely related to quartz and is used extensively as an abrasive. It is usually given a preliminary calcine in rotary furnaces before shipment. The entire Canadian production is derived from a deposit of this commodity at Silica Lake, Colchester County, Nova Scotia; this property was worked by the Oxford Tripoli Company for five months of 1922.

Table 96.—Production of Tripolite in Canada, 1896-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1896.....	644	9,960	1906.....	30	225	1916.....	620	12,139
1897.....	15	150	1907.....	30	195	1917.....	600	18,000
1898.....	1,017	16,660	1908.....	22	134	1918.....	500	12,500
1899.....	1,000	15,000	1909.....	20	122	1919.....	565	11,300
1900.....	336	1,950	1910.....	38	230	1920.....	260	8,600
1901.....	850	15,300	1911.....	620	12,138	1921.....	341	11,268
1902.....	1,052	16,470	1912.....	650	13,000	1922.....	219	5,781
1903.....	835	16,700	1913.....	317	12,119			
1904.....	320	6,400	1914.....			Total.....	11,201	219,941
1905.....	300	3,600	1915.....					

ACTINOLITE

No mining or milling operations were reported in this industry in Canada during 1922. Shipments from milled stock on hand to the United States amounted to 50 tons with a valuation of \$575 as against 78 tons at \$975 in 1921. The average price obtained was \$11.50, while the quotation in the previous year was \$12.50 a ton.

Actinolite is used as an ingredient for coal-tar roofing compounds, care being taken in the grinding so as not to destroy the fibre.

Production of actinolite in Canada has been confined to Elzevir and Kaladar townships in Hastings and Addington counties, province of Ontario, the centre of industry being at Actinolite.

Table 97.—Production of Actinolite in Canada, 1897-1922

Year	Tons	Value	Year	Tons	Value
		\$			\$
1897.....	205	1,845	1913.....	66	720
1898.....	57	4,872	1914.....	119	1,304
1899.....	303		1915.....	220	2,420
1900.....	521	3,126	1916.....	250	2,750
1901.....	550	4,400	1917.....	120	1,320
1902.....	550	3,108	1918.....	228	2,508
1903.....			1919.....	80	880
1904-1909.....	30	330	1920.....	100	1,160
1910.....	67	736	1921.....	78	975
1911.....	92	1,000	1922.....	50	345
1912.....			Total.....	3,686	33,799

ARSENIC

The production of arsenic (As_2O_3) from Canadian ores in 1922 amounted to 2,576 tons valued at \$321,037, an increase of 73 per cent in quantity and 37 per cent in value over the shipments for the previous year. In the smelting of the silver-cobalt-nickel ores from the Cobalt district, 2,058 tons was obtained, and the balance, 518 tons was recovered from arsenical gold concentrates shipped by the Hedley Gold Mining Company, British Columbia, to the smelter operated by the American Smelting and Refining Company, Limited, at Tacoma, Washington.

The price of white arsenic on the New York market rose from 7 cents per pound in March to 13.5 cents in December with an average of 8.5 cents for the year, as against 8.85 cents in the previous year. The increase was due to the large demand for arsenical insecticides to combat the boll-weevil in the cotton districts of southern United States.

Arsenic is generally marketed in the form of white arsenious oxide (As_2O_3) and is used principally in the manufacture of insecticides (Paris green, calcium arsenate and lead arsenate); the glass and tanning industries also consume considerable quantities.

Table 98.—Production of Arsenic in Canada, 1885-1922

Year	White Arsenic		Year	Arsenic in Ore*		White Arsenic	
	Tons	Value		Tons	Value	Tons	Value
		\$			\$		\$
1855.....	440	17,600	1907.....	656	11,094	330	36,209
1886.....	120	5,460	1908.....	986	17,506	716	41,060
1887.....	30	1,200	1909.....	224	3,346	1,129	64,100
1888.....	30	1,200	1910.....	547	5,716	1,502	75,328
1889.....			1911.....			2,097	76,237
1890.....	25	1,500	1912.....			2,045	89,262
1891.....	20	1,000	1913.....			1,692	101,463
1892-3.....			1914.....			1,737	104,015
1894.....	7	420	1915.....			2,396	147,830
1895-8.....			1916.....			2,136	262,349
1899.....	57	4,872	1917.....	280	11,200	2,656	658,231
1900.....	303	22,725	1918.....	1,078	43,114	2,432	520,525
1901.....	695	41,676	1919.....	530	21,218	2,859	488,706
1902.....	800	48,000	1920.....	628	22,231	1,831	425,617
1903.....	257	15,420	1921.....			1,491	233,763
1904-5.....			1922.....	518	21,097	2,058	299,940
1906.....	201	14,058					
			Total.....	5,447	156,522	32,192	3,799,766

*Computed as As₂O₃.Table 99.—Production in Canada, Exports and Imports of Arsenic, (As₂O₃), 1920, 1921 and 1922

	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
PRODUCTION—						
From arsenical concentrates exported Tons	628	22,231			518	21,097
White arsenic.....	1,831	425,617	1,491	233,763	2,058	299,940
Total.....	2,459	447,848	1,491	233,763	2,576	321,037
EXPORTS—						
Arsenic, metallic.....					222	5,238
Arsenic, n.o.p.....	1,655	313,311	767	108,535	1,367	198,005
IMPORTS—						
White arsenic..... Lb.	962	201	1,847	230	441,168	32,520
Sulphide of arsenic.....	337,153	43,445	185,685	26,348	525,246	39,264
Arsenate of soda.....	48,863	10,568	11,993	3,002	7,961	1,402

Table 100.—World's Production of Arsenic (As₂O₃), 1913, 1918-1922

(Long tons)

Country	1913	1918	1919	1920	1921	1922
Canada.....	1,509	3,175	3,023	2,193	1,330	2,532
Australia (a).....		878	64	2,141	624	(b)
Southern Rhodesia (a).....		101	216	390	323	488
Union of South Africa.....		13	9	10	2	
United Kingdom—Arsenic crude and refined	1,693	2,346	2,527	1,997	1,032	(b)
Arsenical pyrites.....	85	477	75	1,178		(b)
China (exports).....	538	138	57	49	98	(b)
France—White Arsenic.....		976	723	275		(b)
Ore.....	4,352	716	2,225	515	570	(b)
Germany.....	1,860	4,326	2,062	2,566	(b)	(b)
Greece.....		(b)	674	952	755	(b)
Japan.....	21	209	821	917	1,382	1,513
Mexico.....		1,849	2,208	2,146	772	267
Norway (a).....		12	20			(b)
Portugal.....	909	(b)	527	642	263	(b)
Spain—White Arsenic.....	46	102	41	75		
Ore.....		246	148	339	321	(b)
United States.....	2,241	5,638	5,376	10,257	4,268	8,952

(a) Ore reported. (b) Data not available.

(c) Source—"Imperial Mineral Resources Bureau."

"Mineral Resources of United States, 1922."

"The Mineral Industry during 1922."

ASBESTOS

The total quantity of asbestos rock mined during 1922 amounted to 2,562,933 tons. Of this, 2,166,385 tons or 84.5 per cent was milled and 158,023 tons of asbestos was recovered in a marketable state. The sales for the year amounted to 163,706 tons for which the producers received \$5,552,723 or an average of \$33.92 per ton. During the previous year, the average value per ton was \$52.89.

The amount of asbestos sold in 1922 was 78 per cent higher than in 1921 when only 92,761 tons was marketed. During the year, the Quebec Government reduced the royalty from 5 per cent of the gross value of asbestos shipped to 2.5 per cent as a measure of assistance to the industry. The entire Canadian production was derived from the eastern townships of Quebec.

Exports of Canadian asbestos (including sand and waste), in 1922 were approximately 76,600 tons in excess of those recorded for the previous twelve months. The tonnage shipped to Great Britain decreased some 47 per cent from the 1921 exports. Shipments of all grades to United States, totalled 139,828 tons or an increase of 53 per cent over the previous year's records. There was a considerable decrease in shipments to the Netherlands. Increased exportations to other European countries will be noted upon examining Table 103.

Table 101.—Production of Asbestos in Canada, 1880-1922

Year	Short Tons	Value	Year	Short Tons	Value
		\$			\$
1880*	380	24,700	1901	40,217	1,259,759
1881*	540	35,100	1902	40,416	1,148,319
1882*	810	52,650	1903	41,677	929,757
1883*	955	68,750	1904	48,465	1,226,352
1884*	1,141	75,097	1905	68,263	1,503,259
1885*	2,440	142,441	1906	82,185	2,060,143
1886*	3,458	206,251	1907	90,426	2,505,042
1887	4,619	226,976	1908	90,773	2,573,335
1888	4,404	255,007	1909	87,300	2,301,775
1889	6,113	426,554	1910	102,215	2,573,603
1890	9,860	1,260,240	1911	127,414	2,943,108
1891	9,279	999,878	1912	136,301	3,137,279
1892	6,082	390,462	1913	161,086	3,849,925
1893	6,331	310,156	1914	117,573	2,909,806
1894	7,630	420,825	1915	136,842	3,574,985
1895	8,756	368,175	1916	154,149	5,228,869
1896	12,250	429,856	1917	153,781	7,230,383
1897	30,442	445,368	1918	158,259	8,970,797
1898	23,785	491,197	1919	159,236	10,975,369
1899	25,536	485,849	1920	199,573	14,792,201
1900	29,141	748,431	1921	92,761	4,906,230
			1922	163,706	5,552,723
			Total	2,646,570	100,016,982

* Exports.

PRODUCTION OF ASBESTOS IN CANADA 1880-1922.

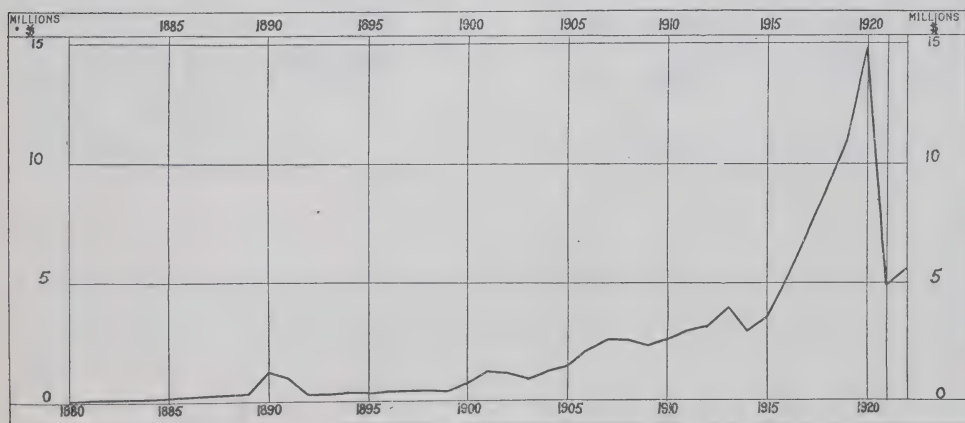
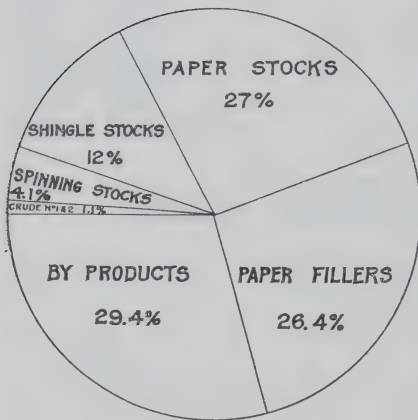


Table 102.—Output and Sales of Asbestos in Canada, 1921 and 1922

Classification	1921				1922			
	Total output	Sold or Shipped			Total output	Quantity	Total sales value at mill	Average value per ton
		Quantity	Total sales value at mill	Average value per ton				
	Tons	Tons	\$	\$	Tons	Tons	\$	\$
Crude No. 1.....	653	222	273,007	1,229 76	759	433	277,492	640 85
Crude No. 2.....	1,741	563	334,132	593 50	2,190	1,351	447,845	331 49
Fiberized crude.....	688	141	59,350	420 92	120	328	64,506	195 56
Spinning stocks.....	9,914	4,969	1,272,700	256 12	11,030	6,739	1,326,920	196 90
Shingle stocks.....	19,325	10,990	1,031,634	93 87	18,587	19,647	1,085,174	55 23
Mill board stocks.....	3,788	3,242	222,343	68 58	3,930	4,386	128,164	29 22
Paper stocks.....	32,595	26,944	1,263,266	46 88	43,196	44,135	1,426,533	32 32
Paper fillers.....	27,199	20,262	308,379	15 22	35,257	43,275	565,671	13 07
By-products (asbestos sand, finish, floats).....	27,474	25,428	141,419	5 56	42,954	43,412	230,418	5 31
Total.....	123,377	92,761	4,906,230	52 89	158,023	163,706	5,552,723	33 92

PRODUCTION OF ASBESTOS IN CANADA IN 1922.

BY GRADES



BY SALES VALUES

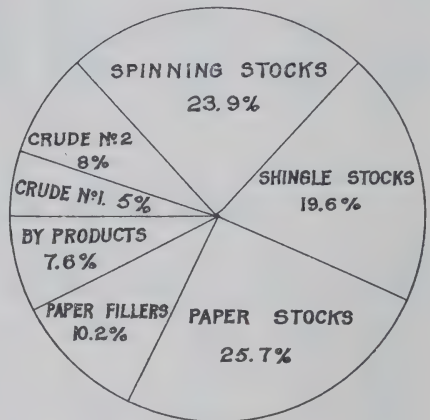


Table 103.—Exports of Canadian Asbestos by Countries of Destination, 1920, 1921 and 1922

Commodity and Destination	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
ASBESTOS—						
Great Britain.....	11,881	1,270,172	4,423	512,009	2,334	271,298
United States.....	115,283	7,955,772	43,374	2,878,172	83,562	3,961,811
Australia.....	483	49,895	175	21,438	25	6,000
Belgium.....	8,251	698,615	3,524	418,518	4,853	343,491
France.....	2,011	216,867	1,932	348,504	3,080	282,222
Germany.....	3,265	396,933	3,437	493,024	6,867	779,808
Italy.....	2,390	290,609	230	32,100	416	32,566
Japan.....	4,863	293,344	1,842	148,430	2,770	159,870
Netherlands.....	1,695	152,783	3,923	560,873	987	142,499
Spain.....	440	32,650			50	4,500
Switzerland.....	5	390				
Other countries.....	2,173	163,506	480	52,243	170	9,505
Total.....	152,740	11,521,536	63,340	5,465,311	105,114	5,993,570
SAND AND WASTE—						
Great Britain.....	30	300	141	2,869	139	1,689
United States.....	36,218	364,526	21,754	209,814	56,266	554,514
Other countries.....	55	1,100	159	3,278	480	6,020
Total.....	36,303	365,926	22,054	215,961	56,885	562,223
ASBESTOS MANUFACTURES INCLUDING ASBESTOS ROOFING—						
Great Britain.....		13,270		7,365		10,184
United States.....		67,544		77,928		74,430
British South Africa.....		1,710				821
France.....		80,634		157,457		
Morocco.....		14,826				
New Zealand.....		7,483				249
Other countries.....		11,201		18,524		10,142
Total.....		198,067		261,274		95,826

Table 104.—World's Production of Asbestos¹, 1913, 1918-1922

(Long tons)

Country	1913	1918	1919	1920	1921	1922
Canada.....	118,361	128,086	136,669	178,190	82,822	146,166
Southern Rhodesia.....	259	7,655	8,696	18,823	19,528	14,248
Union of South Africa.....	859	3,280	3,512	7,112	5,122	4,384
Australia.....		3,034	1,790	825	*	561
Cyprus (exports).....	1,168	228	1,331	800	801	*
India.....		357	388	1,818	316	*
New Zealand.....				2		*
China.....		239	68	5	13	*
Finland.....			33	252	750	*
Germany.....		*	12	28	*	*
Italy.....	172	59	96	162	413	492
Philippine Islands.....		69	369			*
Russia.....	17,218	*	*	1,454	2,651	4,837
Spain.....					19	*
United States.....	982	891	1,036	1,471	742	24

¹Data not available.²Source—"Imperial Mineral Resources Bureau;" "Mineral Resources of United States in 1922;" "Asbestos."

BARYTES

The production of ground barytes in Canada in 1922 amounted to 289 tons valued at \$9,537 as compared with 270 tons sold for \$9,567 in 1921. These shipments were from the mill operated by the Brandram-Henderson, Limited, in connection with the Johnson Barytes mine at Lake Ainslie, Inverness County, Nova Scotia.

Table 105.—Production of Barytes in Canada, 1885-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1885.....	300	1,500	1898.....	1,125	5,533	1911.....	50	400
1886.....	3,864	19,270	1899.....	720	4,402	1912.....	464	5,104
1887.....	400	2,400	1900.....	1,337	7,605	1913.....	641	5,410
1888.....	1,100	3,850	1901.....	653	3,842	1914.....	612	6,169
1889.....			1902.....	1,096	3,957	1915.....	550	6,875
1890.....	1,842	7,543	1903.....	1,163	3,931	1916.....	1,368	19,393
1891.....			1904.....	1,382	3,702	1917.....	3,490	54,027
1892.....	315	1,260	1905.....	3,360	7,500	1918.....	640	10,165
1893.....			1906.....	4,000	12,000	1919.....	468	8,154
1894.....	1,081	2,830	1907.....	1,344	3,000	1920.....	751	22,983
1895.....			1908.....	4,312	19,021	1921.....	270	9,567
1896.....	145	715	1909.....	179	1,120	1922.....	289	9,537
1897.....	571	3,060	1910.....			Total.....	39,882	275,825

Table 106.—Production in Canada and Imports of Barytes, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Nova Scotia—Barytes.....	751	22,983	270	9,567	289	9,537
IMPORTS—						
Barium peroxide.....	83	40,986	54	26,901	82	26,033
Blanc fixe and satin white.....	2,429	102,198	1,418	61,624	2,549	88,541
Barytes.....	2,998	74,314	1,439	40,374	2,954	64,186

CHROMITE

No mining operations were carried on in the chromite industry in Canada during 1922. Shipments amounting to 767 tons valued at \$11,503 were reported from the Black Lake district in the eastern townships of Quebec. This quantity consisted entirely of concentrates shipped from stocks on hand and with the exception of a small quantity was all marketed in the United States. In 1918, some shipments of chromite were made from the Mastadon claim in the Grand Forks Division, British Columbia, but since that date this property has not been operated.

The average price of chromite (50 per cent Cr_2O_3), in the United States, as quoted in the "Engineering and Mining Journal-Press" was about \$22.50 per ton throughout the year.

Table 107.—Production of Chromite in Canada, 1886-1922

Year	Short Tons	Value	Year	Short Tons	Value
		\$			\$
1886.....	60	945	1907.....	7,196	72,901
1887.....	38	570	1908.....	7,225	82,008
1888-93.....			1909.....	2,470	26,604
1894.....	1,000	20,000	1910.....	299	3,734
1895.....	3,177	41,300	1911.....	157	2,587
1896.....	2,342	27,004	1912-13.....		
1897.....	2,637	32,474	1914.....	136	1,210
1898.....	2,021	24,252	1915.....	12,341	179,543
1899.....	2,010	21,842	1916.....	(a) 27,517	311,460
1900.....	2,335	27,000	1917.....	(a) 36,725	499,682
1901.....	1,274	16,744	1918.....	21,994	867,122
1902.....	900	13,000	1919.....	8,541	228,898
1903.....	3,509	51,129	1920.....	11,016	251,379
1904.....	6,074	67,146	1921.....	2,798	55,696
1905.....	8,575	93,301	1922.....	1,087	19,566
1906.....	9,035	91,859	Total.....	184,489	3,130,956

(a) A portion of this ore was sold to a customs mill in the district and the final shipments of ores and concentrates in 1916 were 15,249 short tons valued at \$310,902 or an average of \$20.39 per ton; and in 1917, 23,713 tons valued at \$581,796 or an average of \$24.54 per ton.

Table 108.—Production in Canada, Imports and Exports of Chromite, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
PRODUCTION— Quebec—Chromite.....	11,016	\$ 251,379	2,798	\$ 55,696	767	\$ 11,503
IMPORTS— Bichromate of soda.....	679	267,235	318	59,557	720	118,872
Bichromate of potash.....	8	5,650	32	9,070	48	10,283
EXPORTS.....	8,431	151,456	2,387	32,747	773	8,286

COAL

Output.—The output of coal from Canadian mines during the calendar year 1922 was 15,157,431 short tons, as compared with 15,057,493 tons in 1921 and the record output of 16,946,764 tons in 1920. Fifteen disputes between employees and employers occurred in the coal-mining industry in Canada during the twelve months ending December, thirteen of which were in Alberta and south-eastern British Columbia and the other two in Nova Scotia. In all 25,251 men were affected and 1,222,288 working days' time was lost. Of this time, 931,960 days were lost in the strike which began on April 1; 260,034 days were lost in the short strikes originating in August; 19,036 shifts were lost in short strikes in December and the rest of the time was lost in minor strikes during the year.

The value of the 1922 output was reported as \$65,518,497, or an average of \$4.32 per ton. Higher values were recorded in 1921 and in 1920. Table 109 gives an historical summary of the output and value of coal mined in Canada for each year since 1881.

In the first three months of the year, production was well maintained, but from April to August inclusive, in 1922, the monthly output of coal from Canadian mines varied between 600,000 tons and 900,000 tons; with the resumption of operations in September the output was greatly increased reaching a peak of 1,934,616 tons in October. This was the highest monthly output ever recorded in Canada.

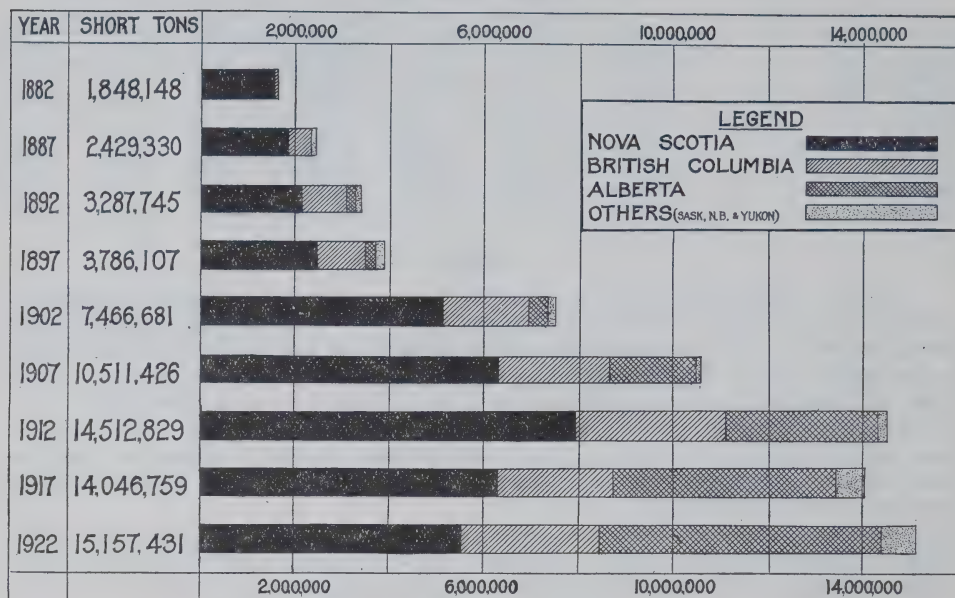
In spite of the losses occasioned by the strike, Alberta retained the premier position among the coal-producing provinces with an output of 5,990,911 tons. Nova Scotia was a close second with 5,569,072 tons and British Columbia mines contributed 2,927,033, placing that province in the third position. Saskatchewan and New Brunswick produced respectively 382,437 tons and 287,513 tons.

Table 109.—Output of Coal from Canadian Mines, 1785-1922

Year	Short tons	Value	Average per ton	Year	Short tons	Value	Average per ton
		\$	\$			\$	\$
1785-1880.....	16,426,253	28,190,518	1-72	1903.....	7,960,364	15,942,833	2-00
1881.....	1,537,106	2,688,621	1-75	1904.....	8,254,595	16,592,231	2-01
1882.....	1,848,148	3,248,446	1-76	1905.....	8,667,948	17,520,263	2-02
1883.....	1,818,684	3,109,635	1-71	1906.....	9,762,601	19,732,019	2-02
1884.....	1,984,959	3,593,831	1-81	1907.....	10,511,426	24,381,842	2-32
1885.....	1,920,977	3,417,807	1-78	1908.....	10,886,311	25,194,573	2-31
1886.....	2,116,653	3,739,840	1-77	1909.....	10,501,475	24,781,236	2-36
1887.....	2,429,330	4,388,206	1-81	1910.....	12,909,152	30,909,779	2-39
1888.....	2,602,552	4,674,140	1-80	1911.....	11,323,388	26,467,646	2-34
1889.....	2,658,303	4,894,287	1-84	1912.....	14,512,829	36,019,044	2-48
1890.....	3,084,682	5,676,247	1-84	1913.....	15,012,178	37,334,940	2-49
1891.....	3,577,749	7,019,425	1-96	1914.....	13,637,529	33,471,801	2-45
1892.....	3,287,745	6,363,757	1-94	1915.....	13,267,023	32,111,182	2-42
1893.....	3,783,499	7,359,080	1-95	1916.....	14,483,395	38,817,481	2-68
1894.....	3,847,070	7,429,468	1-93	1917.....	14,046,759	43,199,831	3-08
1895.....	3,478,344	6,739,153	1-94	1918.....	14,977,926	55,192,896	3-68
1896.....	3,745,716	7,226,462	1-93	1919*.....	13,919,096	55,622,670	3-99
1897.....	3,786,107	7,303,597	1-93	1920*.....	16,946,764	82,496,538	4-86
1898.....	4,173,108	8,224,288	1-97	1921*.....	15,057,493	72,451,656	4-81
1899.....	4,925,051	10,283,497	2-09	1922*.....	15,157,431	65,518,497	4-32
1900.....	5,777,319	13,742,178	2-38				
1901.....	6,486,325	12,699,243	1-96	Total.....	344,558,044	930,981,561	.....
1902.....	7,466,681	15,210,877	2-04				

*The tonnage shown is the total output from all mines in 1919, 1920, 1921 and 1922. For previous years the tonnage shown includes sales, colliery consumption, and coal used by the operators.

OUTPUT OF COAL BY PROVINCES 1882 to 1922



Tonnage Lost.—For the first time it has been possible to prepare a statement showing tonnage lost in all the coal mines of Canada; this table gives the percentage of the possible output produced, by provinces, with analyses of the tonnages lost through each of several different causes. It will be readily understood that in any statement of tonnage lost by operating mines the method of computing the data must be more or less arbitrary. A plan has been worked out by the Bureau which is now being applied in every coal-producing province, and the following outline of the procedure is given in order that the reader may clearly understand how the data in the "Tonnage Lost" tables are obtained.

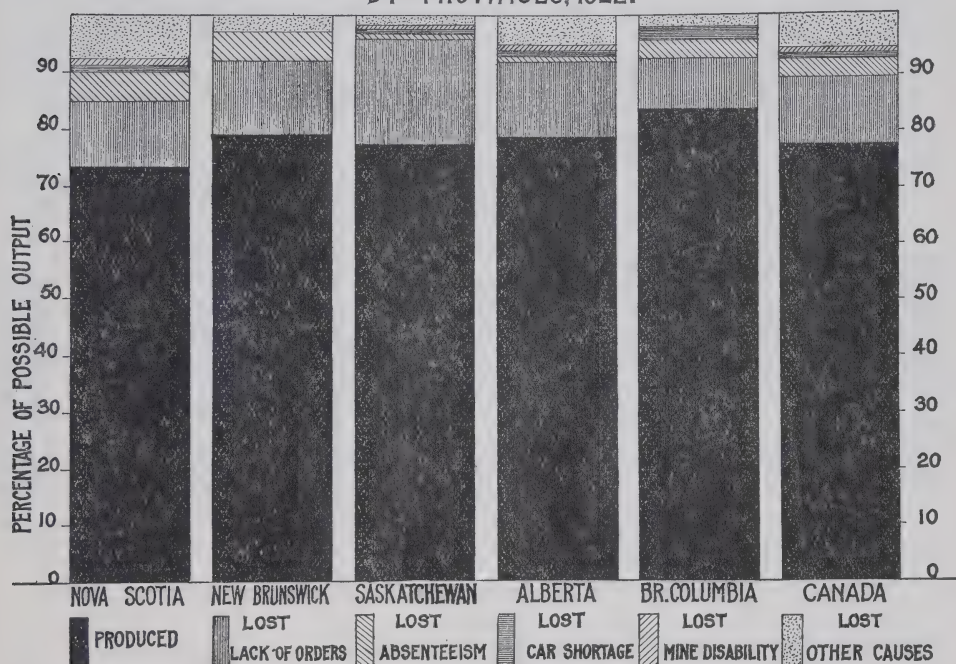
For each month the actual output and the actual number of days' work done by all employees on the colliery pay-rolls are determined and from these two figures the output per man-day is deduced. The number of individual shifts lost by the men whose names are on the colliery pay-roll for the month is recorded, and the total number of shifts so lost is multiplied by the actual tonnage produced per man-day during the month. This lost tonnage plus the actual output of the mine during the month is regarded as the possible output and the percentages given in the tables showing the proportions produced and lost are computed from these figures. The tonnage lost is then analysed according to the cause of loss and the percentage figures are included in the tables.

Computed on the foregoing basis, the tonnage lost in Canadian coal mines during 1922 amounted to 23 per cent of the total output. Of this amount, 12.2 per cent was attributed to "lack of orders," and 6.2 per cent to "other causes." The tonnage lost through absenteeism was 3.1 per cent.

Table 110.—Tonnage Lost in the Coal Mines of Canada in 1922, showing by Provinces the Relative Percentages Produced and Lost with an Analysis of the Percentage Lost

Province	Per cent produced	Per cent lost	Percentage Lost Through				
			Absenteeism	Lack of orders	Car shortage	Mine disability	Other causes
Nova Scotia.....	73	27	5.1	11.9	0.7	0.5	8.8
New Brunswick.....	79	21	5.0	13.0	.....	.....	3.0
Saskatchewan.....	77	23	0.3	19.5	0.4	0.5	2.3
Alberta.....	78	22	1.3	13.3	0.9	0.4	6.1
British Columbia.....	84	16	3.2	9.0	2.4	.....	1.4
Canada.....	77	23	3.1	12.2	1.1	0.4	6.2

TONNAGE PRODUCED AND LOST IN THE COAL MINES OF CANADA BY PROVINCES, 1922.



Disposition.—In Table 111 the disposition of coal from Canadian mines during the past two years has been tabulated, but the items shown differ slightly from those in the similar tables which follow showing the disposition of coal by provinces, in that items have been made to show the tonnages supplied for ships' bunkers and railroads separately from the other shipments. In the subsequent tables, the tonnages for ships' bunkers and railroads have been included under "shipments." A further word of explanation may be given in connection with the items "put on bank" and "lifted from bank". The data show the total quantities put on bank at all mines during the year and the gross amount removed from bank during the year. Shipments of coal, excluding that for ships' bunkers and railroads, were considerably higher in 1922 than in the preceding year although the value of these shipments was appreciably less. On the whole, the disposition of the output in 1922 showed little change from the corresponding data for the preceding year.

Table 111.—Disposition of Coal from Canadian Mines, 1921 and 1922

(Short tons)

	1921			1922		
	Total coal	Total value	Average value per ton	Total coal	Total value	Average value per ton
		\$	\$		\$	\$
Supplied to employees for domestic consumption.....	233,198	634,299	2.72	239,189	604,732	2.52
Used for Power Purposes—						
(a) Shops.....	16,228	54,364	3.35	19,445	59,951	3.08
(b) Colliery boilers.....	1,018,340	3,411,439	3.35	923,202	2,846,309	3.08
(c) Companies' railroads.....	77,825	260,714	3.35	89,504	275,949	3.08
(d) Harbour tugs and dredges.....	1,663	5,571	3.35	465	1,433	3.08
Shipped (See Table 114)—						
(a) Ships' bunkers.....	347,132	2,034,194	5.86	626,789	3,532,761	5.64
(b) Railroads.....	3,211,650	16,539,998	5.15	3,579,212	17,083,811	4.77
(c) Other.....	9,630,705	47,864,604	4.97	9,287,196	41,036,124	4.41
Used in making coke at the colliery.....	109,031	563,690	5.17	77,363	392,091	5.07
Used in making briquettes.....	57,213	139,028	2.43	20,569	27,357	1.33
Put on bank.....	493,723	2,364,933	4.79	689,111	3,809,460	4.80
Put on waste heap.....	409,503	110,566	0.27	336,506	6,425	0.02
Total Disposition.....	15,606,211	73,983,400	4.74	15,888,551	69,176,403	4.35
Lifted from bank.....	548,718	1,531,744	2.79	731,120	3,657,906	5.00
Total Output.....	15,057,493	72,451,656	4.81	15,157,431	65,518,497	4.32

Table 112.—Disposition of Coal from Canadian Mines, by Provinces, 1921

(Short tons)

	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia and Yukon	Total for Canada
Supplied to employees for domestic consumption.....	148,876	1,604	3,853	49,833	29,032	233,198
Shops, etc.....	16,228					16,228
Used under colliery boilers, etc.....	465,181	2,438	14,776	335,953	199,992	1,018,340
Used by companies' railroads.....	49,290		3,250	7,233	18,052	77,825
Shipped. (See Table 114).....	5,006,015	181,001	309,919	5,406,109	2,286,443	13,189,487
Used for making coke at colliery.....					109,031	109,031
Harbour tugs and dredges.....	1,663					1,663
Used in making briquettes.....				57,213		57,213
Put on bank.....	321,462	11,026	2,456	75,853	82,926	493,723
Put on waste heap.....	40,486	51	3,456	73,144	292,366	409,503
Total Disposition.....	6,649,201	196,120	337,710	6,065,335	3,017,842	15,606,211
Lifted from bank.....	314,273	8,928	2,078	69,416	127,318	522,013
Lifted from waste heap.....				26,705		26,705
Total Output.....	5,734,928	187,192	335,632	5,909,217	2,890,524	15,057,493

Table 113.—Disposition of Coal from Canadian Mines, by Provinces, 1922

(Short tons)

	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia and Yukon	Total for Canada
Supplied to employees for domestic consumption.....	150,657	2,785	4,095	51,904	29,748	239,189
Shops, etc.....	19,445					19,445
Used under colliery boilers, etc.....	439,083	5,786	15,602	275,831	186,900	923,202
Used by companies' railroads.....	49,880	58	3,666	8,702	27,198	89,504
Shipped. (See Table 114).....	4,857,835	277,323	355,901	5,612,535	2,389,603	13,493,197
Used for making coke at colliery.....					77,363	77,363
Harbour tugs and dredges.....	465					465
Used in making briquettes.....				20,569		20,569
Put on bank.....	551,820	22,265	3,719	30,800	80,507	689,111
Put on waste heap.....	25,816	127	2,949	64,317	243,297	336,506
Total Disposition.....	6,095,001	308,344	385,932	6,064,658	3,034,616	15,888,551
Lifted from bank.....	525,929	20,831	3,495	73,747	107,118	731,120
Total Output.....	5,569,072	287,513	382,437	5,990,911	2,927,498	15,157,431

Shipments.—A compilation has been made in Table 114 to show the tonnages of coal shipped from Canadian mines by grades and destinations for the past two years. Domestic shipments, including under this heading all shipments direct from the mines to points in Canada, amounted to 7,996,485 tons in 1922, as compared with 7,796,342 tons so shipped in 1921. More Canadian coal was sold for ships' bunkers and for railroad consumption in 1922 than in the preceding year. For these two purposes, 4,206,001 tons was disposed of at the mines. The amount sold for railroad locomotive use was 3,579,212 short tons. The total consumption of coal by railroad locomotives was 9,041,087 tons. Thus, it appears that about one-third of the total consumption of coal by railroad locomotives last year was of Canadian origin. Foreign shipments reported by mine operators and including only the coal shipped direct from the mines for export trade amounted to 1,290,711 tons last year. The total tonnages of Canadian coal cleared through customs ports was 1,818,582 tons. The apparent discrepancy between these two totals is easily explainable and is due largely to the fact that brokers and others purchase considerable quantities of coal from the Canadian mine operators and then dispose of their purchases in the foreign market. Thus, the coal reported by the operator as sold by him for delivery to Canadian points is subsequently exported and this tonnage is included in the customs' records. There is also a difference between the time of shipment and the time of clearing through customs so that the tonnage of coal in transit appears in the one record but is excluded from the other.

From the foregoing, it appears that nearly eight million tons of Canadian coal was burned in Canada during 1922, and of this amount about one-half was consumed in the producing provinces and approximately four million tons of Canadian coal moved in interprovincial trade during the year. Shipments of Nova Scotia coal to other Canadian provinces principally New Brunswick, Prince Edward Island and Quebec amounted to almost 1,883,000 tons. The province of Quebec received about 1,454,000 tons of Canadian coal, an increase of 552,000 tons above the received about 1,454,000 tons of Canadian coal, an increase of 552,000 tons above the receipts of Canadian coal in the preceding year and fully five times as much as reached this province in 1920.

The restoration of the St. Lawrence trade to the normal pre-war figure of 2,000,000 tons per season was therefore almost overtaken during 1922. Shipments of Canadian coal into the province of New Brunswick were about 404,000 tons, while the shipments from that province to other points in Canada amounted to 63,000 tons. Only about 17,000 tons of Canadian coal was shipped into Central Ontario during the year. Manitoba and the section of Ontario lying west of Fort William and Port Arthur received approximately 720,000 tons. Saskatchewan's receipts of Canadian coal were about 1,255,000 tons, while the shipments from that province to other places in Canada were nearly 170,000 tons. Alberta coal to the extent of 1,882,000 tons found its way to other Canadian provinces and 47,000 tons of British Columbia coal was also shipped for consumption in other parts of Canada.

Table 114.—Shipments of Coal from Canadian Mines by Grades and Destinations, 1921 and 1922

(Short tons)

Destination	1921				1922			
	Run of mine	Screened	Slack	Total	Run of mine	Screened	Slack	Total
Nova Scotia.....	820,946	458,701	259,936	1,539,583	633,310	453,722	211,037	1,298,069
Prince Edward Island.....	20,198	51,417	469	72,084	13,982	56,537	476	70,995
New Brunswick.....	445,378	187,069	24,972	657,419	327,004	182,377	52,839	562,220
Quebec.....	823,093	22,350	56,313	901,756	1,186,408	17,239	250,669	1,454,316
Ontario.....	541	7,872	3,491	11,904	14,227	22,123	2,457	38,807
Manitoba.....	170,113	451,119	54,964	676,196	133,242	501,699	63,220	698,161
Saskatchewan.....	197,615	994,249	98,536	1,290,400	226,485	1,096,848	109,063	1,432,396
Alberta.....	257,405	851,553	250,405	1,359,363	263,409	851,790	258,295	1,373,494
British Columbia.....	175,875	718,979	383,909	1,278,763	120,197	713,777	233,593	1,067,567
Yukon.....		8,842	32	8,874	300	81	79	460
Total Domestic Shipments.....	2,911,164	3,752,151	1,133,027	7,796,342	2,918,564	3,896,193	1,181,728	7,996,485
Railroads.....	3,014,260	163,181	34,209	3,211,650	3,220,113	186,024	173,075	3,579,212
Ships' bunkers.....	344,810	2,322		347,132	301,799	321,081	3,909	626,789
Total Railroads and Ships' Bunkers.....	3,359,070	165,503	34,209	3,558,782	3,521,912	507,105	176,984	4,206,001
United States.....	627,658	251,357	199,609	1,078,624	568,912	348,060	147,263	1,064,235
Newfoundland.....	103,081	100,599	3,843	207,523	78,854	127,376	9,992	216,222
West Indies.....	905			905				
Europe.....	365,962	6,104		372,066		386		386
Other countries.....	115,676	57,314	1,871	174,861	1,718	7,868	112	9,698
Lost at Sea.....	384			384		170		170
Total Foreign Shipments.....	1,213,666	415,374	205,323	1,834,363	649,484	483,860	157,367	1,290,711
Total.....	7,483,900	4,333,028	1,372,559	13,189,487	7,089,960	4,887,158	1,516,079	13,493,197

Imports.—Since Canada's coal resources lie in the maritime provinces and in the three western provinces, central Canada has so far been largely dependent upon the United States for its supply of fuel. In 1922, owing to the great strike which tied up United States mines and some of those in Canada, quantities of coal were imported from Great Britain. Table 115, showing these imports by grades, has therefore been prepared. In all, about 819,000 tons was received, 639,000 tons of which was bituminous and nearly 180,000 tons was entered as anthracite. The receipts at customs ports in Quebec of this coal from Great Britain amounted to 762,108 tons and the balance was almost equally divided between Ontario and Nova Scotia. Undoubtedly, some of the coal cleared through the customs ports of Quebec was later shipped into Ontario. Imports of coal from the United States amounted to 13,438,294 tons comprising 10,924,045 tons of bituminous coal and 2,514,249 tons of anthracite. As compared with the records for the preceding year, the imports of bituminous coal were approximately 2,600,000 tons lower and the imports of anthracite were in the neighbourhood of 2,000,000 tons less.

Tables 116 and 117 show for anthracite and bituminous coal respectively the importations by provinces and by grades of coal for the past three years. These data have been supplemented in Table 118 by a compilation showing the average importations of anthracite and bituminous coal from all sources by grades and by provinces during the five years 1918-1922. Similar data for the principal fuel-consuming areas in Central Canada are shown in Table 119.

Table 115.—Imports of Coal into Canada from Great Britain, by Kinds and Grades and by Provinces, 1922

(Short tons)

Destination	Anthracite		Bituminous	
	Egg, Nut, etc.	Dust	Round and run-of-mine	Slack
Nova Scotia.....	5,645		3,267	
Prince Edward Island.....				
New Brunswick.....	19,420		1,999	17,132
Quebec (a).....	139,236	13,281	432,037	177,554
Ontario.....	900		3,712	3,217
Manitoba.....				
Saskatchewan.....				
Alberta.....				
British Columbia (b).....	1,226		504	
Yukon.....				
Canada.....	166,427	13,281	441,519	197,903

(a) Includes Round and Run-of-Mine, 75 tons imported from Other Countries. (b) Imported from other Countries.

Table 116.—Imports of Anthracite Coal into Canada from United States by Kinds and Grades and by Provinces, 1920, 1921 and 1922

(Short tons)

Destination	1920		1921		1922	
	Egg, Nut, etc.	Dust	Egg, Nut, etc.	Dust	Egg, Nut, etc.	Dust
Nova Scotia.....	45,334		62,203	42	21,363	56
Prince Edward Island.....	5,544		6,643		4,589	
New Brunswick.....	57,859		82,509		40,252	
Quebec.....	1,186,674	357,782	1,184,445	127,267	633,237	156,210
Ontario.....	3,124,575	116,889	3,024,304	45,913	1,573,545	70,016
Manitoba.....	12,520	4,989	30,724	2,749	10,975	3,740
Saskatchewan.....	162	44	254		111	120
Alberta.....	341	176	66			
British Columbia.....	75		249	2	34	1
Yukon.....						
Canada.....	4,433,084	479,880	4,291,397	175,973	2,284,106	230,143

Table 117.—Imports of Bituminous Coal into Canada from United States by Kinds and Grades and by Provinces, 1920, 1921 and 1922

(Short tons)

Destination	1920		1921		1922	
	Round and run-of-mine	Slack	Round and run-of-mine	Slack	Round and run-of-mine	Slack
Nova Scotia.....	2,784	260	1,421	454	5,245	988
Prince Edward Island.....	513		238		619	736
New Brunswick.....	936		18,019	23,931	23,982	37,240
Quebec.....	3,100,196	403,214	2,059,632	624,934	1,052,360	264,309
Ontario.....	10,497,651	1,839,252	8,854,892	1,854,854	7,917,917	1,529,676
Manitoba.....	23,601	19,946	25,815	51,018	29,491	45,357
Saskatchewan.....	535		645	1,482	385	1,099
Alberta.....	348	259	797	1,032	538	609
British Columbia.....	9,372	3,756	16,926	155	9,664	3,798
Yukon.....	9		5		32	
Canada.....	13,635,945	2,266,687	10,978,390	2,557,960	9,040,233	1,883,812

Table 118.—Average Imports of Coal into Canada by Kinds and Grades and by Provinces for the Five Years, 1918-1922

(Short tons)

Destination	Anthracite			Bituminous			Grand Total
	Egg, Nut, etc.	Dust	Total	Round and run-of-mine	Slack	Total	
Nova Scotia.....	49,548	19	49,567	3,884	396	4,280	53,847
Prince Edward Island.....	6,190		6,190	800	147	947	6,637
New Brunswick.....	71,820	574	72,394	13,694	18,115	31,809	104,203
Quebec.....	1,158,820	219,073	1,377,893	2,373,182	638,129	3,011,311	4,389,204
Central Ontario.....	2,569,399	92,561	2,661,960	7,530,872	1,737,221	9,268,093	11,930,053
Head of Lakes.....	277,589	1,469	279,058	1,789,767	119,508	1,889,275	2,168,333
Total Ontario.....	2,846,988	94,030	2,941,018	9,300,639	1,856,729	11,157,368	14,098,386
Manitoba.....	13,552	2,391	15,943	26,697	34,880	61,577	77,520
Manitoba and Head of Lakes.....	291,141	3,860	295,001	1,796,464	154,388	1,950,852	2,245,853
Saskatchewan.....	105	41	146	586	661	1,247	1,393
Alberta.....	94	34	128	458	701	1,159	1,287
British Columbia.....	146		146	9,964	2,540	12,504	12,650
Yukon.....				13		18	18
Canada.....	4,147,263	316,162	4,463,425	11,729,422	2,552,298	14,281,720	18,745,145

Table 119.—Average Imports of Coal into Central Canada by Principal Areas for the Five Years, 1918-1922

(Short tons)

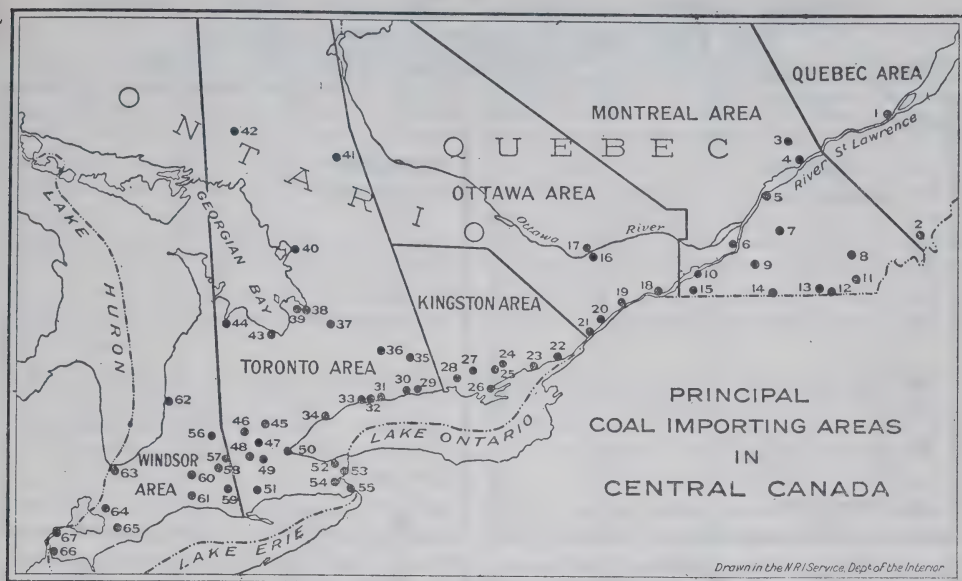
Destination	Anthracite			Bituminous		
	Egg, Nut, etc.	Dust	Total	Round and run-of-mine	Slack	Total
Quebec.....	114,214	19,040	133,254	243,110	51,349	294,459
Montreal.....	1,031,904	196,977	1,228,881	2,090,937	560,595	2,651,532
Ottawa.....	319,324	10,262	329,586	544,823	134,897	679,720
Kingston.....	137,412	729	138,141	81,019	84,835	165,854
Toronto.....	1,773,151	75,700	1,848,851	3,944,846	857,375	4,802,221
Windsor.....	326,878	6,312	333,190	2,107,553	439,569	2,547,122
Total.....	3,702,883	309,020	4,011,903	9,012,288	2,128,620	11,140,908

Table 120.—Stocks of Coal held by Wholesale and Retail Dealers, by Provinces at December 31, 1922

(Compiled in the Internal Trade Branch)

(Short tons)

Provinces	Anthracite From		Bituminous From			Canadian Lignite	Other	Total
	United States	Great Britain	United States	Great Britain	Canada			
Nova Scotia.....	3,184			1,696	7,676			12,556
New Brunswick.....	886	80		53	1,600		110	2,729
Prince Edward Island.....					2,203			2,203
Quebec.....	22,797	262	65,946		1,091		1,907	92,003
Ontario.....	53,219	880	309,300	250	749	212	269	364,879
Manitoba.....	23,505		65,720		8,343	20,480	237	118,255
Saskatchewan.....	2,419		13,717		3,449	52,750	542	72,877
Alberta.....	30		13,529		3,124	22,662		39,345
British Columbia.....	48		35		18,442	732		19,257
Canada.....	106,988	1,222	468,247	1,999	46,677	96,836	3,065	724,134



Key to the Ports of Entry Shown on the Map

QUEBEC AREA—

- 1 Quebec City
- 2 Megantic

MONTREAL AREA—

- 3 Shawinigan Falls
- 4 Three Rivers
- 5 Sorel
- 6 Montreal
- 7 St. Hyacinthe
- 8 Sherbrooke
- 9 St. John's
- 10 Valleyfield
- 11 Coaticook
- 12 Beebe Junction
- 13 Mansonville
- 14 St. Armand
- 15 Athelstan

OTTAWA AREA—

- 16 Ottawa
- 17 Hull
- 18 Cornwall
- 19 Morrisburg
- 20 Prescott
- 21 Brockville
- 22 Gananoque
- 23 Kingston
- 24 Napanee
- 25 Deseronto
- 26 Picton
- 27 Belleville
- 28 Trenton

TORONTO AREA—

- 29 Cobourg
- 30 Port Hope
- 31 Bowmanville

TORONTO AREA—Con.

- 32 Oshawa
- 33 Whitby
- 34 Toronto
- 35 Peterboro
- 36 Lindsay
- 37 Orillia
- 38 Port McNicoll
- 39 Midland
- 40 Parry Sound
- 41 North Bay
- 42 Sudbury
- 43 Collingwood
- 44 Owen Sound
- 45 Guelph
- 46 Kitchener
- 47 Galt
- 48 Paris
- 49 Brantford
- 50 Hamilton

TORONTO AREA—Con.

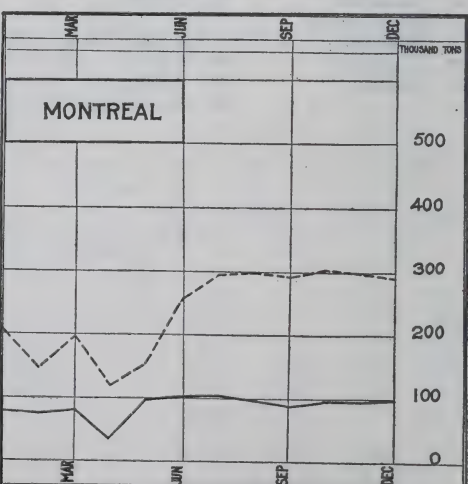
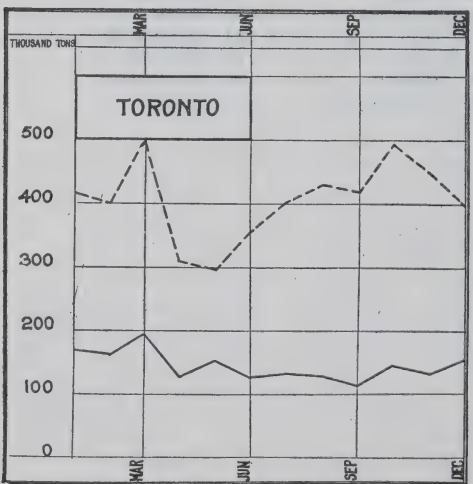
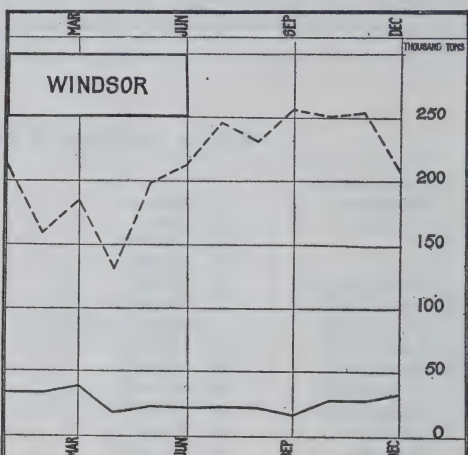
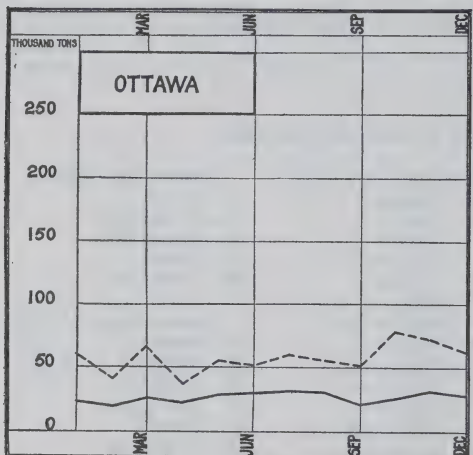
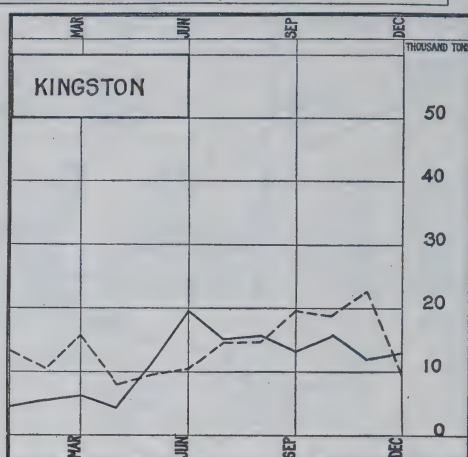
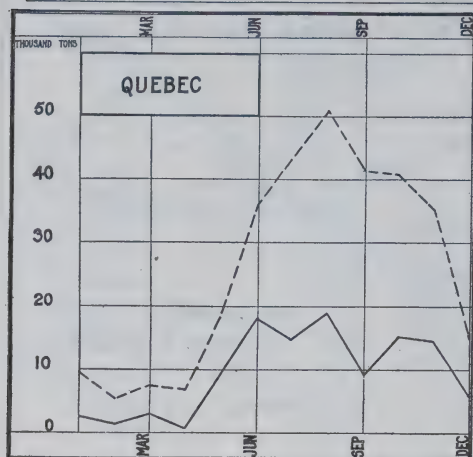
- 51 Simcoe
- 52 St. Catharines
- 53 Niagara Falls
- 54 Welland
- 55 Bridgeburg

WINDSOR AREA—

- 56 Stratford
- 57 Woodstock
- 58 Ingersoll
- 59 Tillsonburg
- 60 London
- 61 St. Thomas
- 62 Goderich
- 63 Sarnia
- 64 Wallaceburg
- 65 Chatham
- 66 Amherstburg
- 67 Windsor

AVERAGE MONTHLY IMPORTS OF COAL INTO CENTRAL CANADA BY KINDS AND BY PRINCIPAL AREAS 1918-1922.

ANTHRACITE IN DOMESTIC SIZES ———— : INDUSTRIAL FUEL INCLUDING ANTHRACITE DUST & ALL BITUMINOUS - - - - -



Consumption.—Summary statistics have been prepared in Table 122 to show the output, exports, interprovincial shipments, imports and coal made available for consumption in Canada by provinces in 1922. Table shows the quantities of coal imported from Great Britain separately from the importations received from the United States.

The apparent consumption of coal in Canada during 1922 was 27,596,273 tons as compared with 31,173,837 tons in 1921 and 35,204,137 tons in 1920. The output figures shown in this table were reported by the companies operating producing mines. The data on interprovincial shipments were also compiled from the monthly statements sent in by the coal operators. The imports and exports items were compiled from data supplied by the Department of Customs and in the case of imports, the figures given show the total quantity of coal imported during the year. Imported coal dumped at the ports of Fort William and Port Arthur has been included in this table with the quantities cleared from customs in the ports of Manitoba since most of the coal unloaded at the Canadian ports at Head of the Lakes finds its way westward to points in Manitoba.

From the table it appears that in 1922, Canada produced 15.1 million tons, exported 1.8 million tons, imported from the United States 13.4 million tons and from Great Britain 0.8 million tons and thus apparently consumed 27.5 million tons. In 1921, when the output was 15 million tons, the quantity exported amounted to 1.9 million tons, imports 18.1 million tons and the apparent consumption was 31.2 million tons. While business conditions generally were somewhat depressed in 1922, the decreased consumption of coal was due in part to the difficulty experienced in obtaining sufficient supplies because of the shortage consequent upon the long-drawn-out strike in the coal-fields. As a matter of historical interest, Table 121 has been included showing the annual consumption of coal in Canada for the past twenty years.

Table 121.—Annual Consumption of Coal in Canada, 1903-1922

Year	Canadian		Imported		Total	Per capita
	Short tons	%	Short tons	%		
1903.....	6,005,735	52.2	5,491,870	47.8	11,507,605	2.005
1904.....	6,697,183	49.2	6,909,651	50.8	13,606,834	2.346
1905.....	7,032,661	48.9	7,343,880	51.1	14,376,541	2.362
1906.....	7,927,560	51.7	7,398,906	48.3	15,326,466	2.425
1907.....	8,617,352	45.0	10,549,503	55.0	19,166,855	2.947
1908.....	9,156,478	47.3	10,195,424	52.7	19,351,902	2.820
1909.....	8,913,376	47.9	9,711,826	52.1	18,625,202	2.682
1910.....	10,532,103	50.2	10,438,123	49.8	20,970,226	2.960
1911.....	9,822,749	40.5	14,424,949	59.5	24,247,698	3.365
1912.....	12,385,696	46.0	14,549,104	54.0	26,934,800	3.657
1913.....	13,450,158	42.6	18,132,387	57.4	31,582,545	4.196
1914.....	12,214,403	45.5	14,637,920	54.5	26,852,323	3.490
1915.....	11,500,480	48.1	12,406,212	51.9	23,906,692	3.041
1916.....	12,348,036	41.3	17,517,820	58.7	29,865,856	3.717
1917.....	12,313,603	37.2	20,810,132	62.8	33,123,735	4.049
1918.....	13,160,731	37.8	21,611,101	62.2	34,771,832	4.175
1919.....	11,849,046	41.1	16,982,773	58.9	28,831,819	3.401
1920.....	14,388,541	40.9	20,815,596	59.1	35,204,137	4.079
1921.....	13,070,217	41.9	18,103,620	58.1	31,173,837	3.547
1922.....	13,338,849	48.3	14,257,424	51.7	27,596,273	3.078

In the foregoing table the "Consumption" figures for each year from 1903 to 1918 were computed by adding production (sales, colliery consumption and coal supplied to employees) to imports, and deducting Canadian coal exported. Data for 1919-1922 were compiled as for Table 122.

Table 122.—Summary Statistics for 1922—Output, Exports, Interprovincial Shipments, Imports and Coal made Available for Consumption in Canada, by Provinces

(Short Tons)

Province	Canadian Coal				Imported from U.S.A.	Imported from Great Britain	Coal Available for Consumption
	Output	Received from other provinces	Shipped to other provinces	Exported			
<i>Nova Scotia—</i>							
Anthracite.....					21,419	5,645	27,064
Bituminous.....	5,569,072	39	1,882,787	641,304	6,233	3,267	3,054,520
Total.....	5,569,072	39	1,882,787	641,304	27,652	8,912	3,081,581
<i>New Brunswick—</i>							
Anthracite.....					40,252	19,420	59,672
Bituminous.....	287,513	403,742	63,067	66,460	61,222	19,131	642,081
Total.....	287,513	403,742	63,067	66,460	101,474	38,551	701,753
<i>Prince Edward Island—</i>							
Anthracite.....					4,589		4,589
Bituminous.....		70,995			1,355		72,350
Total.....		70,995			5,944		76,939
<i>Quebec—</i>							
Anthracite.....					789,447	152,517	941,964
Bituminous.....		1,454,214		55,275	1,316,669	609,591	3,325,199
Lignite.....		102					102
Total.....		1,454,316		55,275	2,106,116	762,108	4,267,265
<i>Central Ontario—</i>							
Anthracite.....					1,586,036	900	1,586,936
Bituminous.....		(a) 16,864		76	7,485,324	6,929	7,509,041
Total.....		16,864		76	9,071,360	7,829	9,095,977
<i>Manitoba and Head of Lakes—</i>							
Anthracite.....		10			72,240		72,250
Bituminous.....		94,607		2,082	2,037,117		2,129,642
Lignite.....		625,487					625,487
Total.....		720,104		2,082	2,109,357		2,827,379
<i>Saskatchewan—</i>							
Anthracite.....		796			231		1,027
Bituminous.....		147,209		5,040	1,494		143,653
Lignite.....	382,437	1,106,648	169,813				1,319,272
Total.....	382,437	1,254,653	169,813	5,040	1,715		1,463,952
<i>Alberta—</i>							
Anthracite.....	40,417		2,034				38,383
Bituminous.....	2,846,405	10,646	243,758	915	1,147		2,613,525
Lignite.....	3,104,089	588	1,636,498				1,468,179
Total.....	5,990,911	11,234	1,882,290	915	1,147		4,120,087
<i>British Columbia and Yukon—</i>							
Anthracite.....		1,228			35	1,226	2,489
Bituminous.....	2,927,498	38,172	46,876	1,047,430	13,494	504	1,885,362
Lignite.....		73,486					73,486
Total.....	2,927,498	112,886	46,876	1,047,430	13,529	1,730	1,961,337
<i>Canada—</i>							
Anthracite.....	40,417	2,034	2,034		2,514,249	179,708	2,734,374
Bituminous.....	11,630,488	2,236,488	2,236,488	1,818,582	10,924,045	639,422	21,375,373
Lignite.....	3,486,526	1,806,311	1,806,311				3,486,526
Total.....	15,157,431	4,044,833	4,044,833	1,818,582	13,438,294	(b) 819,130	27,596,273

(a) Maritime coal. (b) Includes 1,805 tons from Other Countries.

COKE

Summary statistics relating to the production of coke and its by-products have been included in this report as a matter of interest. These production data refer only to by-product and beehive oven plants and do not include retort coke recovered by gas companies.

Table 123.—Summary Statistics of Coke and its By-Products in Canada, 1920, 1921 and 1922

		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
			\$		\$		\$
Coke—							
Coal charged to ovens—							
Domestic.....	Tons	960,148	5,211,982	586,185	3,305,922	487,907	1,657,835
Imported.....	"	977,364	5,651,652	910,845	7,351,428	565,496	3,447,928
Total.....	"	1,937,512	10,863,634	1,497,030	10,657,350	1,053,403	5,105,763
Output of coke, by Provinces—							
Nova Scotia.....	Tons	428,298	3,988,589	222,761	1,895,920	181,955	873,133
Ontario.....	"	690,406	5,627,878	664,214	7,798,720	410,183	3,510,173
British Columbia.....	"	151,618	1,907,624	124,872	1,354,729	107,960	1,176,877
Total.....	"	1,270,322	11,524,091	1,011,847	11,049,369	700,098	5,560,183
Recovery of coke in per cent of coal treated.....	%	65.5		67.5		66.4	
Imports of coke.....	Tons	586,406	6,458,596	228,030	1,766,101	336,270	3,094,042
Exports of coke.....	"	29,536	390,161	20,907	256,928	19,821	205,627
Consumption of coke.....	"	1,827,192	17,592,526	1,218,970	12,558,542	1,016,547	8,448,598
By Products—							
<i>Production in Canada—</i>							
Ammonium sulphate.....	Tons	18,880	1,435,418	16,303	1,122,382	11,143	553,159
Gas.....	M. cu. ft.	9,161,701	1,636,879	8,634,148	1,200,808	6,073,763	725,398
Light oils.....			379,190		452,571		37,110
Tar and tar products.....	Imp. gal.	12,423,412	451,019	11,288,212	387,934	7,616,433	233,978
Other products.....			205,224		136,682		297,935
Total.....			4,137,730		3,300,377		1,847,580
Imports—							
Ammonium sulphate.....	Tons	312	31,531	157	11,513	413	24,659
Coal tar and pitch.....	Gals.	3,527,667	256,740	4,091,424	235,896	4,289,683	248,986
Coal tar base or salt (parantraniline).....	Tons	42	51,395	21	17,677	141	53,917
Exports—							
Ammonium sulphate.....	Tons	18,329	1,896,660	14,648	784,628	10,285	532,983
Tar and pitch.....	Gals.	8,815,172	481,259	3,540,417	361,621	2,016,594	223,619

FELDSPAR

The demand for Canadian feldspar showed a slight falling-off during 1922. In the province of Quebec, the deposits in Derry township were operated throughout the year. Development work was carried on by the St. Lawrence Feldspar Company on their deposit at Quatechou-Manicouagan Bay, Saguenay County, Quebec. This property, it is expected, will be ready to ship feldspar in 1923. Ontario deposits in Bathurst township, Lanark county, Monteagle township, Hastings county, and Loughborough township, Frontenac county, were also operated during the year.

The total shipments reported in 1922 were 27,727 tons including 15,255 tons from Ontario and 12,472 tons from Quebec. Crude spar sold for \$8.44 a ton; ground, \$19.20; and dental, \$22. In addition to the sales of the crude and ground grades, a quantity of crushed spar and dust was sold for use as stucco dash in the building industry. A shipment of dental spar was also made during the year.

This mineral in a finely ground condition is used in the enamelware, pottery and porcelain, washing compounds, abrasives, glass, roofing and paint industries and also in a coarser form as a constituent of artificial walls and floors. The Canadian production which is around 28,000 tons of feldspar per year is mainly exported in the crude form to United States for grinding. During 1922 seven of the twenty-five or more available feldspar grinding plants in the United States received and ground over 22,000 tons of Canadian spar. According to an article published

in the bulletin of the American Ceramic Society,¹ the largest consumers in the United States during 1920 were compelled to take active steps to secure a more satisfactory supply of the ground material. The outstanding features of the industry in that country were given as follows:—

- (1) Many grinding companies do not own or control all or even a major part of their sources of crude material, but buy in job lots from many sources.
- (2) There is a great need of more adequate engineering and chemical control over mines and mills.
- (3) Out of date, inefficient methods and equipment for mining and grinding are in common use.
- (4) Little or no co-operation exists between feldspar producers, but on the contrary many feldspar companies are exceedingly secretive. This tends towards (a) preservation of obsolete methods; (b) want of knowledge of the essential features of production, market requirements, and the relation between total milling and consuming capacities of the country; (c) inefficient and often mistaken trade practices; (d) unprofitable and even ruinous competition in dull periods.
- (5) The small size of many feldspar deposits precludes maintenance of an efficient organization at each individual mine.
- (6) Many of the best deposits of feldspar situated close to railroads are becoming depleted, which results in gradual lowering of grades, and increase in cost for better grades.
- (7) There is a lack of exact knowledge of the ceramic properties and behavior of feldspar by some consumers, which results in (a) purchase of feldspar on the basis of price alone, thus encouraging low production costs at the expense of quality, and (b) inefficient and expensive cross-hauling of both crude and ground feldspar.
- (8) The grinding capacity of the country greatly exceeds the consuming capacity. There are more than 25 mills with a total capacity in excess of 300,000 tons per year, for a normal consumption of not more than 150,000 tons per year.
- (9) There is a lack of uniform tests, specifications and standards of quality and fineness for different uses; and lack of standard definitions of grades.

Since the consumption of spar in Canada in the finely-ground condition is not much over 3,000 tons per annum, no difficulty has been experienced in securing raw materials of a quality suitable for any section of the industry. The bulk of the Canadian supply is now supplied by Canadian mills. With the large deposits of good grades of crude spar now available, it does not appear that Canadian industries will ever find any difficulty in securing a standard product.

The grinding plant at Ashbridges Bay owned by the Feldspar Milling Company of Toronto, was operated throughout the year. The capacity of this plant is about 6,000 tons per annum. A new plant with a capacity of 1,500 tons a year was completed by the Frontenac Floor and Wall Tile Company at Kingston, Ontario in 1921 and was operated in 1922.

Table 124.—Production of Feldspar in Canada, 1890-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1890.....	700	3,500	1901.....	5,350	10,700	1912.....	13,733	30,916
1891.....	685	3,425	1902.....	7,576	15,152	1913.....	16,790	60,795
1892.....	175	525	1903.....	13,928	18,966	1914.....	18,060	70,824
1893.....	575	4,525	1904.....	11,083	22,166	1915.....	14,559	57,801
1894.....			1905.....	11,700	23,400	1916.....	19,488	71,407
1895*.....		2,545	1906.....	16,948	40,890	1917.....	19,462	89,826
1896*.....	972	2,583	1907.....	12,584	29,819	1918.....	18,782	112,728
1897.....	1,400	3,290	1908.....	7,877	21,099	1919.....	14,679	86,231
1898.....	2,500	6,250	1909.....	12,783	40,383	1920.....	37,873	280,895
1899.....	3,000	6,000	1910.....	15,809	47,667	1921.....	29,868	230,754
1900.....	318	1,112	1911.....	17,723	51,939	1922.....	27,727	248,402
Total.....							374,707	1,696,515

* Exports

¹ "Conditions in Feldspar Industry" Raymond B. Ladoo, Vol. 1—No. 1—Page 7.

Table 125.—World's Production of Feldspar 1913, 1918-1922

(Long Tons)

Country	1913	1918	1919	1920	1921	1922
United Kingdom†.....	66,626	36,999	47,869	76,467	35,976	*
Canada.....	14,991	16,770	14,236	32,907	26,668	24,756
Australia.....				4	26	*
Germany (Bavaria).....	*	3,711	6,422	5,756	7,132	*
Italy.....		1,493	1,080	2,560	2,360	*
Norway (exports).....	40,186	1,009	3,007	4,165	8,421	*
Sweden.....	37,269	17,563	12,698	117,233	119,917	*
United States.....	107,996	88,498	63,441	135,551	91,865	117,127

*Data not available.

†Including China Stone.

‡Exports.

SOURCE—Imperial Mineral Resources Bureau.
Mineral Resources of United States in 1922.

Table 126.—Production in Canada, Imports and Exports of Feldspar, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION (shipments)—						
Nova Scotia.....			16	117		
Quebec.....	649	10,052	9,737	80,180	12,472	127,826
Ontario.....	37,224	270,843	20,115	150,457	15,255	120,576
Total.....	37,873	280,895	29,868	230,754	27,727	248,402
IMPORTS.....	1,991	44,390	1,050	25,120	1,454	31,408
EXPORTS.....	38,768	219,744	27,293	169,864	24,995	170,954

FLUORSPAR

The production of fluorspar in Canada in 1922, amounted to 4,503 tons or approximately 1,000 tons less than that recorded for 1921. The shipments consisted of 284 tons crude at \$13.75 per ton and 4,219 tons of concentrates at \$23.29 a ton.

The principal producer during the year was the Rock Candy mine at Archibald, near Grand Forks, British Columbia. A total of 7,094 tons of fluorspar was raised at this mine and 6,313 tons was milled in the decrepitation plant located on the same property. Rejects amounting to 2,186 tons, were re-treated by flotation at the Trail plant during the year. From these two processes, the concentrates mentioned were produced.

In Ontario, 198 tons of fluorspar was mined during the year. Shipments of crude fluorspar totalling 284 tons were reported by four operators in the Madoc district.

A part of the fluorspar produced in Canada was used in this country and the remainder was shipped to steel plants in the United States. The continued depression in the steel industry was again reflected in the production of fluorspar and improvement in the steel industry would probably closely followed by an increased fluorspar production.

Table 127.—Production in Canada, Imports and Exports of Fluorspar, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Ontario.....	3,758	68,475	116	1,744	284	3,905
British Columbia.....	7,477	171,971	5,403	134,523	4,219	98,233
Total.....	11,235	240,446	5,519	136,267	4,503	102,138
IMPORTS—						
Hydro-fluo-silicic acid.....	1.2	409	1.05	212	.06	15
Fluorspar.....	6,812	113,818	3,867	43,752	4,980	73,343
EXPORTS.....	6,900	109,683	4,625	51,470	2,944	32,914

GRAPHITE

Natural Graphite—Sales of graphite exceeded production in Canada in 1922 and pointed the way to renewed activity in this field. Only 100 tons was mined during the year but sales totalled 597 tons, valued at \$31,353. The flake grade sold for approximately \$170 a ton and dusts at \$35 as compared with \$196 for the former and \$47 for the latter grade in 1921.

Shipments were reported by the Black Donald Graphite Company, Ltd., and the Quebec Graphite Company. While no mining was done by the former firm, its mill at Whitefish Lake, was operated intermittently during the year treating some 1,700 tons. The latter company's sales were made from stocks on hand.

The plant of the Standard Graphite Company, Limited, (now Canadian Graphite Corporation) at Guenette, Quebec, was completed during the year and 100 tons of ore was milled, mainly for experimental purposes.

The United States tariff legislation, passed in 1922, levied the following duties on importations of crude or refined graphite: amorphous, 10 per cent ad valorem; crystalline lump, chip or dust, 20 per cent ad valorem; crystalline flake, 1.5 cents per pound.

Table 128.—Production of Graphite in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1886.....	500	4,000	1899.....	1,130	24,179	1912.....	2,060	117,122
1887.....	300	2,400	1900.....	1,922	31,040	1913.....	2,162	90,282
1888.....	150	1,200	1901.....	2,210	38,780	1914.....	1,647	107,203
1889.....	242	3,160	1902.....	1,095	23,300	1915.....	2,635	124,223
1890.....	175	5,200	1903.....	728	23,745	1916.....	3,955	325,362
1891.....	260	1,560	1904.....	452	11,760	1917.....	3,714	402,892
1892.....	167	3,763	1905.....	541	16,735	1918.....	3,114	248,870
1893.....			1906.....	387	18,300	1919.....	1,360	100,221
1894*.....	3	223	1907.....	579	16,000	1920.....	2,190	165,617
1895.....	220	6,150	1908.....	251	5,565	1921.....	937	65,862
1896.....	139	9,455	1909.....	864	47,800	1922.....	597	31,353
1897.....	436	16,240	1910.....	1,392	74,087			
1898.....		13,698	1911.....	1,269	69,576	Total.....	39,783	2,251,923

*Exports.

Table 129.—Production in Canada, Imports and Exports of Graphite, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Ore milled.....	5,153		1,500		1,800	
Output, milled graphite.....	2,155					
PRODUCTION (shipments)—						
No. 1 Flake.....	196	40,382	149	29,187	597	31,353
No. 2 Flake.....	225	28,572				
No. 3 Flake and Dust.....	1,769	96,663	788	36,675		
Total.....	2,190	165,617	937	65,862	597	31,353
IMPORTS—						
Crucibles, plumbago.....		90,092		23,786		39,061
Plumbago, not ground or otherwise manufactured.....		4,352		4,141		1,007
Plumbago, ground and manufactures of, n.o.p.....		102,568		47,463		47,095
EXPORTS—						
Graphite or plumbago, crude or refined....	2,142	159,817	614	40,809	452	16,619

Artificial Graphite.—Artificial graphite is manufactured in electric furnaces at Niagara Falls, Ontario, by the Acheson Graphite Company. The annual production over a period of fifteen years is shown in the following table:

Table 130.—Artificial Graphite made in Canada, 1908-1922

Year	Pounds	Year	Pounds	Year	Pounds
1908.....	428,540	1913.....	2,184,472	1918.....	1,808,698
1909.....	513,436	1914.....	1,234,239	1919.....	358,524
1910.....	2,442,166	1915.....	497,271	1920.....	207,180
1911.....	2,172,098	1916.....	525,048	1921.....	376,508
1912.....	2,302,625	1917.....	1,096,172	1922.....	724,524

GYPSUM

The total output of gypsum rock in Canada during 1922 amounted to 484,629 tons, of which quantity 145,954 tons or 30 per cent was calcined. The quantity quarried, by provinces was: Nova Scotia 281,861 tons; New Brunswick, 56,692 tons; Ontario, 106,829 tons; Manitoba, 39,147 tons; British Columbia, 100 tons.

For statistical purposes the production of gypsum is considered to be the sum of the quantities disposed of in the different marketable forms, care being taken to avoid duplication; the values used are those at point of shipment.

Shipments of all grades totalled 559,265 tons valued at \$2,160,898, an increase of 172,715 tons and \$375,360 over the 1921 production. The 1922 production included lump or mine run, crushed, fine ground and calcined gypsum sold; calcined gypsum used in the calcining plants for the production of wall plaster, alabastine and other gypsum products was also included. The average value per ton received by operators throughout Canada was, by grades; lump, \$1.52; crushed, \$2.26; fine ground, \$6.22; and calcined, \$10.67. Prices during the previous year averaged as follows: lump \$1.78; crushed, \$2.56; fine ground, \$3.42 and calcined \$10.61.

Table 131.—Production of Gypsum in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1886.....	162,000	178,742	1889.....	244,566	257,329	1912.....	578,458	1,324,620
1887.....	154,008	157,277	1900.....	252,101	259,009	1913.....	636,370	1,447,739
1888.....	175,887	179,393	1901.....	293,799	340,148	1914.....	516,880	1,156,207
1889.....	213,273	205,108	1902.....	333,599	379,479	1915.....	474,815	854,929
1890.....	226,509	194,033	1903.....	314,489	388,459	1916.....	342,915	738,563
1891.....	203,605	206,251	1904.....	345,961	373,474	1917.....	336,332	881,984
1892.....	241,048	241,127	1905.....	442,158	586,168	1918.....	152,287	823,005
1893.....	192,568	196,150	1906.....	469,022	643,294	1919.....	299,063	1,215,287
1894.....	223,631	202,031	1907.....	485,921	646,914	1920.....	429,144	1,893,991
1895.....	226,178	202,608	1908.....	340,964	575,701	1921.....	386,550	1,785,538
1896.....	207,032	178,061	1909.....	473,129	809,632	1922.....	559,265	2,160,898
1897.....	239,691	244,531	1910.....	525,246	934,446			
1898.....	219,256	232,515	1911.....	518,383	993,394	Total.....	12,436,103	24,088,066

Table 132.—Summary of Statistics on Gypsum in Canada, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Ore mined.....	460,020		434,545		484,629	
Ore calcined.....	148,864		121,878		145,954	
PRODUCTION BY GRADES—						
Lump.....	262,442	457,158	195,456	347,180	350,650	534,160
Crushed.....	48,379	146,947	66,893	171,567	68,181	154,197
Fine ground.....	6,615	46,584	7,000	24,025	5,769	35,880
Calcined.....	111,708	1,243,300	117,181	1,242,762	134,665	1,436,661
Total.....	429,144	1,893,991	386,550	1,785,538	559,265	2,160,898
PRODUCTION BY PROVINCES—						
Nova Scotia.....	260,661	573,755	206,831	511,883	332,404	580,148
New Brunswick.....	49,405	428,183	54,030	360,220	82,462	517,668
Ontario.....	74,707	404,162	84,790	433,053	110,227	621,668
Manitoba.....	44,371	487,894	40,859	480,280	34,072	440,914
British Columbia.....			40	100	100	500
Total.....	429,144	1,893,991	386,550	1,785,538	559,265	2,160,898
EXPORTS—						
Crude.....	244,428	413,522	230,011	417,502	325,354	505,464
Ground.....	12,576	232,736	4,509	80,239	3,186	59,534
Total.....	257,004	646,258	234,520	497,741	328,540	564,998
IMPORTS—						
Crude.....	2,294	25,477	2,952	31,303	2,872	21,040
Ground.....	118	3,966	41	2,427	143	5,592
Plaster of Paris.....	2,822	48,859	2,635	42,325	3,657	49,015
Total.....	5,234	78,302	5,628	76,055	6,672	75,647

IRON OXIDES

The output of iron oxides in Canada is marketed in two forms—crude and calcined. The former is dried before shipment for use in the purification of illuminating gas, while the latter is calcined and ground for consumption in the paint industry.

Shipments of iron oxides in 1922 amounted to 7,285 tons valued at \$110,608, comprising 4,880 tons crude and 2,405 tons calcined and ground.

In addition to the usual production of oxides from the bog iron ore deposits in the province of Quebec a trial shipment was made to Calgary, Alberta, by a small operator in the Windermere District, British Columbia.

Table 133.—Production of Iron Oxides in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1886.....	350	2,350	1899.....	2,919	20,000	1912.....	7,654	32,410
1887.....	485	3,733	1900.....	1,966	15,395	1913.....	5,987	41,774
1888.....	397	7,900	1901.....	2,233	16,735	1914.....	5,890	51,725
1889.....	794	15,280	1902.....	4,955	30,495	1915.....	6,248	48,353
1890.....	275	5,125	1903.....	6,266	32,760	1916.....	8,811	58,711
1891.....	900	17,750	1904.....	3,925	24,995	1917.....	9,409	87,605
1892.....	390	5,800	1905.....	5,105	34,675	1918.....	17,317	112,440
1893.....	1,070	17,700	1906.....	6,758	36,125	1919.....	11,862	113,427
1894.....	611	8,690	1907.....	5,828	35,570	1920.....	19,128	157,909
1895.....	1,339	14,600	1908.....	4,746	30,440	1921.....	9,048	93,610
1896.....	2,362	16,045	1909.....	3,940	28,093	1922.....	7,285	110,608
1897.....	3,905	23,560	1910.....	4,813	35,185			
1898.....	2,226	17,450	1911.....	3,622	28,333	Total.....	181,819	1,433,359

Table 134.—Production in Canada, Imports and Exports of Iron Oxides, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION.....	19,128	157,909	9,048	93,610	7,285	110,608
IMPORTS—						
Ochrey earths.....	3,231	182,997	1,217	61,576	1,766	73,115
Oxides.....	3,567	619,923	2,191	346,070	3,671	443,869
EXPORTS *	1,528	78,913	1,491	66,631	1,259	60,104

* Mineral pigments, iron oxides and ochres.

MAGNESITE

The total quantity of magnesite mined in Canada during 1922 was 8,678 tons. Of this 8,292 tons was milled. Sales during the year totalled 2,849 tons valued at \$76,294 as against 3,730 tons at \$81,320 in 1921.

The average value obtained per ton of magnesite sold, by grades, was; calcined, \$22.83; and deadburned, \$29. During 1921, the prevailing prices were, crude, \$8.98; calcined, \$25.15; and dead-burned, \$35.75.

The entire production of magnesite in 1922 came from deposits in Argenteuil county, Quebec. The North American Magnesite Producers, Limited, the Scottish Canadian Magnesite Company, Limited, and the International Magnesite Company, Limited, were as usual the only Quebec producers.

Dead-burned magnesite is consumed entirely in the metallurgical industry as a refractory lining for furnaces. Calcined magnesite is used as a plastic material for floors and walls in buildings and also in the manufacture of pipe and furnace coverings.

The "New Tariff Act of 1922 on Imports into United States," which came into effect in September, 1922, provided the following duties on the various forms of magnesite; Crude magnesite, $\frac{5}{16}$ of 1 cent per pound; caustic calcined magnesite, $\frac{5}{8}$ of 1 cent per pound; dead-burned and grain magnesite, not suitable for manufacture into oxychloride cements, $\frac{2}{40}$ of 1 cent per pound.

On the Atlantic seaboard, in the United States, imported dead-burned magnesite, sold for \$22 per ton in the month of August. In December, at Baltimore, the price quoted was \$43.50, or an increase of \$17.50 per ton.

Table 135.—Production of Magnesite in Canada, 1908-1922

Year	Tons	Value	Year	Tons	Value
		\$			\$
1908.....	120	840	1916.....	55,413	563,829
1909.....	330	2,508	1917.....	58,090	728,275
1910.....	323	2,160	1918.....	39,365	1,016,765
1911.....	991	5,531	1919.....	11,273	328,465
1912.....	1,714	9,645	1920.....	18,378	512,756
1913.....	515	3,335	1921.....	3,730	81,320
1914.....	358	2,240	1922.....	2,849	76,294
1915.....	14,779	126,584			
			Total.....	208,228	3,460,547

Table 136.—Production in Canada, Imports and Exports of Magnesite, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Crude, mined.....	31,040		9,311		8,678	
Crude, calcined.....	30,230		4,648		8,292	
PRODUCTION—						
Crude.....	4,296	39,779	1,673	15,024		
Calcined.....	3,154	64,402	684	17,200	1,026	23,430
Dead-burned.....	10,928	408,575	1,373	49,096	1,823	52,864
Total.....	18,378	512,756	3,730	81,320	2,849	76,294
IMPORTS—						
Magnesia.....	287	84,339	220	87,530	207	34,460
Magnesite.....	1,521	49,799	185	8,000	79	2,198
Magnesite firebrick.....		446,445		61,728		56,561
EXPORTS—						
Crude.....	155	1,662		5	800	1,800
Calcined.....	10,859	425,048	1,351	63,603	940	21,317

MAGNESIUM SULPHATE

The production of magnesium sulphate or crude epsom salts in Canada during 1922 amounted to 1,021 tons, valued at \$24,017 as compared with 2,029 tons worth \$39,506 in 1921. The total quantity extracted during the year was 1,300 tons, as against 1,428 tons in the previous twelve months.

Preliminary shipments were made in 1920 by the Basque Chemical Production Company, Ltd., from several lakes, containing these salts, on the Basque ranch, near Ashcroft, British Columbia. This company continued operations during 1921 and 1922, extracting and refining a considerable quantity. The Stewart-Calvert Company Inc. of Oroville, Washington, did not make any shipments of magnesium sulphate from their deposits in British Columbia. In 1920, this firm made some shipments from its property near Clinton, Lillooet, British Columbia.

The crude magnesium sulphate was sold for use principally in the tanning industry, although the textile and dyeing industries were also consumers. A small amount of the C.P. product was also sold to local dealers. The value of the products shipped varied according to the grades; crude, \$9.42 a ton while the refined product brought \$34.32 per ton. Although some of the product was sold locally, shipments were also made to points in the United States and as far east in Canada as Ontario and Quebec.

Table 137.—Production in Canada, Imports and Exports of Magnesium Sulphate, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Crude.....	1,947	39,886	1,412	18,425	443	4,183
Refined.....			617	21,081	578	19,834
IMPORTS.....		72,709		29,987	1,398	44,499
EXPORTS.....	743	3,737	120	4,562	142	4,838

MANGANESE

No mining operations were reported in the manganese industry in Canada during 1922. Shipments of 73 tons valued at \$2,044 were made from stock on hand at New Ross, Lunenburg County, Nova Scotia. The deposits at Kaslo, British Columbia and the Hill 60 group of claims near Cowichan Lake, Vancouver Island were not worked throughout the year. In 1920, shipments were made from these properties to the Belrowe Alloys Company at Tacoma, Washington, U.S.A.

The manganese ores mined in eastern Canada are pyrolusite, manganite, pysilomelane and bog manganese. These are mostly ores with a high manganese content and are fairly free from deleterious constituents.

Table 138.—Production of Manganese Ore in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1886.....	1,789	41,499	1899.....	1,581	20,004	1912.....	75	1,875
1887.....	1,245	43,658	1900.....	30	1,800	1913.....		
1888.....	1,801	47,944	1901.....	440	4,820	1914.....	28	1,120
1889.....	1,455	32,737	1902*.....	172	4,062	1915.....	201	9,360
1890.....	1,328	32,550	1903.....	91	2,775	1916.....	957	89,544
1891.....	255	6,694	1904.....	66	2,740	1917.....	158	14,836
1892.....	115	10,250	1905*.....	22	1,720	1918.....	440	6,230
1893.....	213	14,578	1906*.....	93	925	1919.....	661	14,159
1894.....	74	4,180	1907*.....	1	22	1920.....	649	11,029
1895.....	125	8,464	1908.....			1921.....	68	3,400
1896*.....	124	3,975	1909.....			1922.....	73	2,044
1897*.....	15	1,166	1910.....					
1898.....	50	1,600	1911.....	6	300	Total.....	14,401	442,060

*Exports

Table 139.—Production in Canada, Imports and Exports of Manganese Ore, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Nova Scotia.....	62	4,140	68	3,400	73	2,044
British Columbia.....	587	6,889				
Total.....	649	11,029	68	3,400	73	2,044
IMPORTS—						
Manganese oxide.....	1,510	93,062	636	47,159	935	43,845
Ferro-silicon, spiegeleisen and ferro-manganese.....	7,908	1,324,061	2,294	295,420	3,725	232,795
EXPORTS—						
Manganese ore.....	640	19,921	28	2,240	191	4,830
Ferro-silicon and compounds.....	25,422	1,297,720	10,031	504,842	20,350	897,272

MICA

Conditions in the mica industry in Canada during 1922 showed a considerable improvement over those prevailing in the previous year. The demand for ground mica for use in the manufacture of ready-roofing, materially increased during the twelve months under review.

The deposits of phlogopite mica in the Lièvre-Gatineau district, Quebec, and in Frontenac county, Ontario, continued to supply nearly the entire Canadian production. Sales reported totalled 3,349 tons valued at \$152,263, as against 702 tons at \$70,063 in 1921.

It will be noted that the stated value of the exports of Canadian mica exceeded by a considerable amount the value placed on shipments reported by operators. An explanation of this lies in the fact that the exportation consisted principally of mica splittings, shipped from large trimming shops, situated in Ontario and Quebec, while most of the shipments by the mines were of mica in its rough-cobbed form.

Under the United States "New Tariff Act" the duties on the different grades of mica are as follows: Mica, unmanufactured, valued at not above 15 cents per pound; 4 cents per pound; valued above 15 cents per pound, 25 per centum ad valorem; mica, cut or trimmed and mica splittings, 30 per centum ad valorem; mica plates, and built-up mica, and all manufactures of mica, of which mica is the component material of chief value, 40 per centum ad valorem; ground mica, 20 per centum ad valorem.

Table 140.—Production of Mica in Canada, 1886-1922

Year	Value	Year	Tons	Value	Year	Tons	Value
	\$			\$			\$
1886.....	29,008	1899.....		163,000	1912.....	580	143,976
1887.....	29,816	1900.....		166,000	1913.....	1,104	194,304
1888.....	30,207	1901.....		160,000	1914.....	595	109,061
1889.....	28,718	1902.....		135,904	1915.....	417	91,905
1890.....	68,074	1903.....		177,857	1916.....	1,208	255,239
1891.....	71,510	1904.....		160,777	1917.....	1,166	358,851
1892.....	104,745	1905.....		178,235	1918.....	747	271,550
1893.....	75,719	1906.....		303,913	1919.....	2,754	273,788
1894.....	45,581	1907.....		312,599	1920.....	2,203	376,022
1895.....	65,000	1908.....		139,871	1921.....	702	70,063
1896.....	60,000	1909.....	369	147,782	1922.....	3,349	152,263
1897.....	76,000	1910.....	758	190,385			
1898.....	118,375	1911.....	590	128,677	Total.....		5,464,7

Table 141.—Production of Mica in Canada by Grades, 1921 and 1922

	1921			1922		
	Pounds	Value f. o. b. shipping point	Price per pound	Pounds	Value f. o. b. shipping point	Price per pound
		\$	\$ cts.		\$	\$ cts.
Rough cobbled.....	329,010	31,920	0-10	186,470	22,305	0-12
Ground mica.....	20,000	15	0-08			
Thumb-trimmed—						
1 x 1 inches.....	21,252	2,857	0-13			
1 x 2 ".....	7,683	1,718	0-22			
1 x 3 ".....	8,064	2,438	0-30			
2 x 3 ".....	4,207	2,115	0-50	95,702	25,837	0-27
2 x 4 ".....	4,891	4,544	0-92			
3 x 5 ".....	1,488	2,264	1-52			
4 x 6 ".....	655	1,240	1-89			
Splittings only.....	20,350	15,365	0-76	112,778	72,303	0-64
Scrap.....	986,230	5,282	0-005	6,302,157	31,818	0-005
Pattern.....	277	305	1-10			
Total.....	1,404,107	70,063	0-05	6,697,107	152,263	0-02

Table 142.—Production in Canada and Exports of Mica, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Quebec.....	737	281,460	484	41,172	1,360	97,748
Ontario.....	1,466	94,562	218	28,891	1,989	54,515
Total.....	2,203	376,022	702	70,063	3,349	152,263
EXPORTS—						
Cobbled.....	42	55,724	12	12,942	74	45,151
Splittings.....	522	725,946	185	195,479	286	366,974
Scrap and waste.....	2,739	33,963	967	12,061	3,473	41,949
Plate and manufactures.....		8,474		4,201		10,438
Total.....		824,107		224,683		464,512

MINERAL WATERS

Mineral waters produced in Canada during 1922 amounted to 221,433 gallons valued at \$14,220 as compared with 328,273 gallons at \$21,716 in the previous year. Mineral springs in Ontario and Quebec contributed the total Canadian production.

In the present compilation, there has been included a record of all known shipments of natural mineral waters sold to the general public for medicinal purposes. No record has been kept of the shipments made of ordinary spring waters.

The values given do not take into account any mineral waters used at the springs for drinking or bathing purposes but include only the shipments from the springs in bottles or other containers.

Table 143.—Production of Mineral Waters in Canada, 1888-1922

Year	Gals.	Value	Year	Value	Year	Gals.	Value
		\$		\$			\$
1888.....	124,850	11,456	1900.....	75,000	1912.....		172,465
1889.....	424,600	37,360	1901.....	100,000	1913.....		173,677
1890.....	561,165	66,031	1902.....	100,000	1914.....		134,111
1891.....	427,485	54,268	1903.....	100,000	1915.....		115,274
1892.....	640,380	75,348	1904.....	100,000	1916.....		127,806
1893.....	725,096	108,347	1905.....	100,000	1917.....		145,814
1894.....	767,460	110,040	1906.....	100,000	1918.....		154,468
1895.....	739,382	126,048	1907.....	136,020	1919.....		71,015
1896.....	706,372	111,736	1908.....	151,953	1920.....		24,582
1897.....	749,691	141,477	1909.....	175,173	1921.....	328,273	21,716
1898.....	555,000	100,000	1910.....	199,563	1922.....	221,433	14,220
1899.....		100,000	1911.....	223,758	Total.....		3,758,726

Table 144.—Production in Canada, Imports and Exports of Mineral Waters, 1920, 1921 and 1922

	1920	1921	1922
	Value	Imp. Gals. Value	Imp. Gals. Value
	\$	\$	\$
PRODUCTION, by provinces—			
Quebec.....	10,109	19,626	7,278
Ontario.....	14,473	308,647	14,438
Total.....	24,582	328,273	21,716
IMPORTS—Mineral and aerated waters.....	204,907	159,092	156,420
EXPORTS—Mineral and aerated waters.....	12,796	44,022	123,555

NATRO-ALUNITE

The deposit of natro-alunite located at Kyuquot Sound on the West Coast of Vancouver Island, British Columbia, which was operated during 1921 was idle throughout 1922. Milling operations were carried on for twenty-six days in March at the plant at Esquimalt, near Victoria, owned by the San Juan Mining and Manufacturing Company. The treatment of this ore consisted in crushing, grinding and roasting. The resultant product, calcined alunite, was used as a fertilizer, for its potash content. Shipments during the year amounted to 50 tons at \$2,500 as against 30 tons worth approximately \$1,500 in the previous twelve months.

NATURAL GAS

Natural gas produced in Canada during 1922 amounted to 14,682,651 thousand cubic feet, an increase of 605,050 thousand cubic feet, or 4.3 per cent over the 1921 production. The output from Ontario was 4 per cent less than that in 1921 but Alberta and New Brunswick showed substantially increased production.

The total value of the Ontario production as recorded was \$4,076,296 or \$996,000 higher than in the previous year, due to the fact that in 1922 the retail price of gas was used in obtaining the value, whereas, in previous years, the value as reported by the producers was used.

The Alberta production showed an increase in quantity of 923,000 M cu. ft. or 15 per cent to a total of 5,868,439 M cu. ft., and of \$247,506 in value or 18 per cent to \$1,622,105. In this province several large industrial concerns operated wells to supply their own demands, and in some instances, therefore a value for the product was not given, while in other cases only a nominal value was placed on the gas consumed. In order to obtain a value for this gas that would be comparable with the other records it was necessary to evaluate it at the average price paid by consumers throughout the province.

The production in the province of New Brunswick was 753,898 thousand cubic feet or 6 per cent over the output for the previous year.

Table 145.—Production of Natural Gas in Canada, 1892-1922

Year	Value	Year	Value	Year	M. cu. ft.	Value
	\$		\$			\$
1892.....	150,000	1903.....	202,210	1914.....	21,692,504	3,484,727
1893.....	376,233	1904.....	328,376	1915.....	20,124,162	3,706,035
1894.....	313,754	1905.....	379,561	1916.....	25,476,458	3,958,029
1895.....	423,032	1906.....	583,523	1917.....	27,408,940	5,045,298
1896.....	276,301	1907.....	815,032	1918.....	20,140,309	4,350,940
1897.....	325,873	1908.....	1,012,660	1919.....	19,937,769	4,176,037
1898.....	322,123	1909.....	1,207,029	1920.....	16,845,518	4,232,642
1899.....	387,271	1910.....	1,346,471	1921.....	14,077,601	4,594,164
1900.....	417,094	1911.....	1,907,678	1922.....	14,682,651	5,846,501
1901.....	339,476	1912.....	2,362,700			
1902.....	195,992	1913.....	2,309,381	Total.....		55,376,143

Table 146.—Production of Natural Gas in Canada, 1920, 1921 and 1922

	1920		1921		1922	
	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value
PRODUCTION—		\$		\$		\$
New Brunswick.....	682,502	130,506	708,743	139,375	753,898	148,040
Ontario.....	10,529,374	2,920,731	8,422,774	3,080,130	8,060,114	4,076,296
Alberta.....	5,633,442	1,181,345	4,945,884	1,374,599	5,868,439	1,622,105
Manitoba.....	200	60	200	60	200	60
Total.....	16,845,518	4,232,642	14,077,601	4,594,164	14,682,651	5,846,501

PEAT

The output of peat in Canada during 1922 amounted to 4,700 tons, of which quantity, 3,000 tons valued at \$14,500 was sold. In 1921, shipments of 1,666 tons, valued at \$6,664 were reported.

The total Canadian production of peat was derived from the Alfred bog, where experimental operations were conducted jointly by the Ontario and Federal Governments.

Table 147.—Production of Peat in Canada, 1900-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1900.....	400	1,200	1908.....	60	180	1916.....	300	1,500
1901.....	220	600	1909.....	60	240	1917-18.....		
1902.....	475	1,663	1910.....	841	2,604	1919.....	986	6,561
1903.....	1,100	3,300	1911.....	1,463	3,817	1920.....	4,550	18,650
1904.....	800	2,400	1912.....	700	2,900	1921.....	1,666	6,664
1905.....	80	260	1913.....	2,600	10,100	1922.....	3,000	14,500
1906.....	474	1,422	1914.....	685	2,470			
1907.....	50	200	1915.....	300	1,050	Total.....	20,110	82,281

PETROLEUM

The total production of petroleum in Canada during 1922 amounted to 179,068 barrels valued at \$611,176, a decrease of 8,473 barrels or 4.6 per cent in quantity and \$30,357 or 4.8 per cent in value from the sales in the previous years.

Ontario continued to be the principal petroleum-producing province in Canada, contributing 164,732 barrels at \$526,316 to the Dominion total. Entering into its sixty-first year of activity, the old Petrolia field produced 64,935 barrels, a decline of 3,549 barrels from the 1921 total.

Activities in this industry in the province of New Brunswick were as usual confined to the Stony Creek district, Albert county, where wells were operated by the New Brunswick Gas and Oilfields, Limited. The output of petroleum in this province amounted to 7,778 barrels with a selling value of \$4.20 per barrel.

The Alberta production was 6,559 barrels, a decline of 644 barrels from the previous year's total and 4,473 barrels from the 1920 record. Wells near Black Diamond, Turner Valley field were responsible for the main portion of the production.

Under the "Petroleum Bounty Act," Canadian producers continued to be paid a bounty of $1\frac{1}{2}$ cents per gallon on all oil of a specific gravity above 0.8235. The administration of this act is under the supervision of the Department of Trade and Commerce. Owing to the light character of the crude petroleum produced in Alberta, only a small part of the output earns the bounty.

Table 148.—Production of Crude Petroleum in Canada, 1881-1922

Year	Barrels*	Value	Year	Barrels*	Value	Year	Barrels*	Value
		\$			\$			\$
1881.....	368,987		1896.....	726,822	1,155,647	1911.....	291,092	357,073
1882.....	389,573		1897.....	709,857	1,011,546	1912.....	243,336	345,050
1883.....	472,866		1898.....	758,391	1,061,747	1913.....	228,080	406,439
1884.....	571,000		1899.....	808,570	1,202,020	1914.....	214,805	343,124
1885.....	587,563		1900.....	710,498	1,151,607	1915.....	215,464	300,572
1886.....	584,061	525,655	1901.....	622,392	1,008,275	1916.....	198,123	392,284
1887.....	713,728	556,708	1902.....	530,624	951,190	1917.....	213,832	542,239
1888.....	695,203	713,695	1903.....	486,637	1,048,874	1918.....	304,741	885,143
1889.....	704,690	653,600	1904.....	503,474	935,895	1919.....	240,466	736,324
1890.....	795,030	902,734	1905.....	634,095	856,028	1920.....	196,251	822,255
1891.....	755,298	1,010,211	1906.....	569,753	761,760	1921.....	187,541	641,533
1892.....	779,753	984,438	1907.....	788,872	1,057,088	1922.....	179,068	611,176
1893.....	798,406	874,255	1908.....	527,987	747,102			
1894.....	829,104	835,322	1909.....	420,755	559,604	Total.....	21,598,821	†28,422,881
1895.....	726,138	1,086,738	1910.....	315,895	388,550			

*35 imperial gallons. †From 1886.

Table 149.—Production of Crude Petroleum in Ontario*, by Fields, 1921 and 1922

Field	1921				1922			
	Barrels	Value less Bounty	Bounty Paid	Total Value	Barrels	Value less Bounty	Bounty Paid	Total Value
		\$	\$	\$		\$	\$	\$
Petrolia and Enniskillen.....	68,484	185,591	35,954	221,545	64,935	173,375	34,091	207,466
Oil Springs.....	40,967	111,020	21,507	132,527	43,214	115,380	22,687	138,067
Moore Township.....	7,536	20,423	3,957	24,379	7,275	19,424	3,819	23,243
Sarnia Township.....	4,068	11,026	2,136	13,162	3,224	8,607	1,692	10,299
Plympton Township.....	481	1,302	252	1,555	695	1,856	365	2,221
Bothwell.....	26,877	72,837	14,110	86,947	25,681	68,568	13,482	82,050
Tilbury East.....	1,003	2,717	526	3,243	127	338	67	405
West Dover.....	7,473	20,253	3,923	24,176	5,482	14,638	2,878	17,516
Raleigh Township.....	3,320	8,998	1,743	10,741	663	1,771	348	2,119
Dutton.....					387	1,033	203	1,236
Onondaga.....	566	1,534	297	1,832	489	1,307	257	1,564
Moza Township.....	10,764	29,171	5,651	34,822	11,959	31,932	6,279	38,211
Thamesville.....	1,320	3,576	693	4,269	383	1,024	202	1,226
Dawn Township.....					217	579	114	693
Total.....	172,859	468,448	99,749	559,198	164,731	439,832	86,484	526,316

*Supplied by the Supervisor of Crude Petroleum Bounties, Petrolia, Ont.

Table 150.—Production of Crude Petroleum in Canada, by Provinces, 1920, 1921 and 1922

Province	Year	Barrels	Value Less Bounty	Bounty Paid	Total Value	Value per barrel (including bounty)
			\$	\$	\$	\$ cts.
New Brunswick.....	1920	5,148	17,682	2,281	19,963	3 88
	1921	7,479	29,094	3,928	33,022	4 41
	1922	7,778	28,359	4,373	32,732	4 20
Ontario.....	1920	180,071	630,867	95,419	726,286	4 04
	1921	172,859	468,449	90,749	559,198	3 24
	1922	164,732	439,832	86,484	526,316	3 20
Alberta.....	1920	11,032	75,986		75,986	6 89
	1921	7,203	49,313		49,313	6 85
	1922	6,559	51,882	246	52,128	7 95
Canada.....	1920	196,251	724,535	97,700	822,235	4 19
	1921	187,541	546,856	94,677	641,533	3 42
	1922	179,068	520,073	91,103	611,176	3 41

Table 151.—Imports into Canada, and Exports of Petroleum and its Products, 1920, 1921 and 1922

	1920		1921		1922	
	Gal.	\$	Gal.	\$	Gal.	\$
IMPORTS—						
Crude petroleum in its natural state, .7900 specific gravity or heavier at 60 degrees temperature, when imported by oil refiners to be refined in their own factories.....	290,736,366	20,814,899	355,300,352	20,010,091	419,559,952	21,602,247
Crude petroleum, gas oils other than naphtha, benzine and gasoline lighter than .8235 but not less than .775 specific gravity at 60 degrees.....	178,641	28,869	222,241	18,737	913,415	76,900
Petroleum (not including crude petroleum imported to be refined, or illuminating or lubricating oils) .8235 specific gravity or heavier at 60 degree temperature.....	122,750,650	7,790,137	61,176,430	3,796,977	71,891,597	3,014,390
Petroleum, imported by miners or mining companies or concerns, for use in the concentration of ores of metals in their own concentrating establishments.....	16,249	1,344	18,022	3,579	17,672	4,075
KEROSENE AND ILLUMINATING OILS						
Coal oil and kerosene, distilled, purified or refined.....	14,971,509	2,359,621	10,544,281	790,468	3,673,234	314,514
Illuminating oils, composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon.....	176,340	127,889	120,416	62,323	99,497	50,045
LUBRICATING OILS						
Lubricating oils, composed wholly or in part of petroleum, and costing less than 25 cents per gallon.....	881,102	175,478	2,032,361	374,596	3,898,930	720,223
Lubricating oils, n.o.p.....	4,376,192	2,267,611	3,008,095	1,559,965	3,211,124	1,412,473
OTHER OILS						
Gasoline under .725 specific gravity at 60 degrees temperature.....	8,515,545	2,404,488	21,101,146	4,665,200	24,743,275	5,411,972
Gasoline .725 specific gravity but not heavier than .750 specific gravity at 60 degrees temperature (a).....					13,466,769	2,579,643
Gasoline, n.o.p.....			19,163,561	2,946,258	3,902,204	769,309
All other oils, n.o.p.....	222,041	113,681	57,667	39,040	144,927	60,469
OTHER PRODUCTS OF PETROLEUM						
Grease, axle..... Lb.	8,408,394	803,848	3,289,526	296,971	2,851,550	177,575
Paraffine wax..... "	2,425,959	276,772	1,362,188	72,661	870,564	51,032
Paraffine wax candles..... "	538,285	124,764	201,906	45,729	199,762	39,299
Vaseline and all similar preparations of petroleum for toilet, medicinal or other purposes.....		386,127		219,886		242,743
Petroleum, products of, n.o.p..... Gal.	48,769,546	10,891,302	13,113,087	1,990,496	1,330,170	289,815
Total Petroleum and its Products, Imported.....		48,566,830		36,892,977		36,816,724
EXPORTS—						
Oil, coal and kerosene, crude..... Gal.	2,684,427	293,325	5,384,751	375,820	7,036,627	288,828
Oil, coal and kerosene, refined..... "	1,243,335	205,999	1,466,422	209,282	1,471,947	136,834
Oil, gasoline and naphtha..... "	160,433	59,432	762,080	212,638	1,976,244	510,037
Oil, mineral, n.o.p..... "			105,499	31,279	1,155,865	206,709
Wax, mineral..... Cwt.	26,915	230,172	821	7,552	15,615	45,526
Total Petroleum and its Products, Exported.....		788,928		836,571		1,187,934

(a) Included under "Gasoline, n.o.p.," prior to May 24, 1922.

Petroleum Refinery Statistics.—As a matter of interest there has been tabulated a record of the crude petroleum and other materials used in the oil refineries of Canada during the past three years and a list showing the quantities and values of the refined products made.

Table 152.—Materials Used and Products Made by the Oil Refineries of Canada, 1920, 1921 and 1922

	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
MATERIALS USED—						
Crude oil, product of Canadian wells..... Imp. gal.	6,711,070	835,870	5,899,881	503,714	5,849,442	514,746
Crude oil, imported..... “	288,865,457	34,586,671	366,122,361	32,794,456	388,289,613	34,538,969
Sulphuric acid (66° Be) (Not made by firm reporting)..... Lb.	48,001,510	547,503	57,839,800	674,855	86,398,728	1,058,230
Sulphur (not used in acid manufacture) “	66,666	2,242	102,540	3,165	84,260	2,407
Caustic soda..... “	2,738,824	107,207	3,563,907	167,550	3,750,331	174,922
Litharge..... “	204,423	25,244	360,758	34,191	518,291	44,906
Clay..... “	251,065	3,812	223,432	3,123	159,840	2,733
Other materials.....		716,344		673,036		1,792,967
Total.....		36,824,893		34,854,090		38,129,880
PRODUCTS MADE—						
Gasoline..... Imp. gal.	86,193,664	28,272,902	119,887,613	31,026,136	143,959,893	34,428,189
Petroleum spirits..... “	2,447,489	577,028	2,055,227	431,649	3,124,828	561,498
Kerosene..... “	54,155,655	10,887,972	59,082,790	7,537,470	76,521,560	9,628,804
Fuel and gas oils..... “	96,462,792	10,341,946	129,716,045	6,611,261	106,975,976	6,142,927
Lubricating oils..... “	17,192,398	4,429,362	17,345,119	3,854,475	17,185,003	3,143,545
Grease..... Lb.	7,695,701	545,174	6,674,262	269,679	8,186,013	156,353
Petroleum coke..... Tons	33,576	297,400	65,395	621,912	70,422	597,806
Wax and candles..... Lb.	10,398,127	973,805	10,777,994	310,267	12,063,768	329,147
Other products.....		1,350,087		902,554		1,507,552
Total.....		57,675,676		51,565,403		56,495,821

PHOSPHATE

While no phosphate rock was mined during 1922, shipments amounting to 190 tons valued at \$1,796 were made. The provinces of Quebec and Ontario were the only producers of this commodity, the former contributing 131 tons and the latter 59 tons.

Importations, principally Florida phosphate, recorded for the year amounted to 11,515 tons averaging \$4.90 per ton as compared with 13,711 tons at \$6.31 per ton in the previous year.

Table 153.—Production of Phosphate in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1886.....	20,495	304,338	1899.....	3,600	18,000	1912.....	164	1,640
1887.....	23,690	319,815	1900.....	1,415	7,105	1913.....	385	3,643
1888.....	22,485	242,285	1901.....	1,033	6,280	1914.....	954	7,275
1889.....	30,988	316,662	1902.....	856	4,953	1915.....	217	2,502
1890.....	31,753	361,045	1903.....	1,329	8,214	1916.....	203	2,514
1891.....	23,588	241,603	1904.....	817	4,596	1917.....	149	1,486
1892.....	11,932	157,424	1905.....	1,300	8,425	1918.....	140	1,200
1893.....	8,198	70,942	1906.....	850	6,375	1919.....	24	331
1894.....	6,861	41,166	1907.....	824	6,018	1920.....		
1895.....	1,822	9,565	1908.....	1,596	14,794	1921.....	30	450
1896.....	570	3,420	1909.....	998	8,054	1922.....	190	1,796
1897.....	908	3,984	1910.....	1,478	12,578			
1898.....	733	3,665	1911.....	621	5,206	Total.....	202,596	2,209,343

Table 154.—Production in Canada, Imports and Exports of Phosphate, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Quebec.....			30	450	131	1,320
Ontario.....					59	476
Total.....			30	450	190	1,796
IMPORTS—						
Phosphate rock.....	13,476	114,480	13,711	86,530	11,515	56,353
Acid phosphate (a).....	1,728	369,105	1,545	253,644	1,756	224,577
Phosphorus.....	43	49,699	25	24,380	68	55,540
Phosphor tin and bronze.....	124	120,720	105	103,804	135	112,417
Superphosphate (b).....		470,970		484,368		403,621
EXPORTS—Phosphate rock.....	76	645				

(a) Probably refined phosphate of lime and phosphate of soda.

(b) Probably for use as fertilizer.

PYRITES

The total mine output of pyritic ore (iron and copper sulphides) in Canada during 1922 was 17,867 tons. Shipments for the same period totalled 18,143 tons, comprising 11,235 tons from Ontario and 6,908 tons from British Columbia. Ontario operators received an average value of \$3.54 per ton for their product while British Columbia producers obtained an average of \$5 per ton.

The total sulphur content of the 1922 production was 6,900 tons; the percentage of sulphur varied from 37 per cent to 42 per cent with an average of 38 per cent.

No copper-pyritic ore was shipped by the Weedon mines in Quebec in 1922. The Caldwell mine and the Sulphide mine, owned respectively, by the Grasselli Chemical Company, Limited, and the Nichols Chemical Company, Limited, were the Ontario shippers. In British Columbia, the Hidden Creek mine at Anyox and the Sullivan mine at Kimberley were active during the year.

According to Customs records no exports of pyrites were made in 1922.

Table 155.—Production of Pyrites in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1886.....	42,906	193,077	1899.....	27,687	110,748	1912.....	81,526	314,081
1887.....	38,043	171,194	1900.....	40,031	155,164	1913.....	158,566	521,181
1888.....	63,479	285,656	1901.....	35,261	130,544	1914.....	228,314	744,508
1889.....	72,225	307,292	1902.....	35,616	138,939	1915.....	286,038	985,190
1890.....	49,227	123,067	1903.....	33,982	127,713	1916.....	309,251	1,084,095
1891.....	67,731	203,193	1904.....	37,180	134,033	1917.....	416,649	1,610,762
1892.....	59,770	179,310	1905.....	33,339	125,486	1918.....	411,616	1,705,219
1893.....	58,542	175,626	1906.....	42,743	169,990	1919.....	176,487	522,704
1894.....	40,527	121,581	1907.....	46,243	212,491	1920.....	174,744	719,110
1895.....	34,198	102,594	1908.....	47,336	224,824	1921.....	33,368	116,326
1896.....	33,715	101,155	1909.....	64,644	222,814	1922.....	18,143	74,303
1897.....	38,910	116,730	1910.....	53,870	187,062			
1898.....	32,218	128,872	1911.....	82,666	365,820	Total.....	3,506,791	12,912,454

Table 156.—Production in Canada, Imports and Exports of Pyrites, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Quebec.....	14,817	44,451	1,986	10,463		
Ontario.....	148,652	618,283	27,785	101,306	11,235	39,763
British Columbia.....	11,275	56,376	3,597	4,557	6,908	34,540
Total.....	174,744	719,110	33,368	116,326	18,143	74,303
Sulphur content.....	67,608		12,213		6,900	
IMPORTS—						
Brimstone or sulphur, crude or in roll or flour.....	144,733	2,113,713	78,762	1,272,619	123,158	1,700,604
EXPORTS—						
Sulphur contained in pyrites.....	119,136	458,403	7,875	31,500		

Sulphuric Acid.—Eight firms manufactured sulphuric acid in Canada during 1922.

Statistics have been collected giving the production of this commodity in terms of the standard grades of 50° Bé and 60° Bé and 66° Bé. For comparative purposes it has been deemed advisable to reduce the first two grades to their equivalent in 66° Bé, acid.

Table 157.—Production,* Imports and Exports of Sulphuric Acid, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Sulphur used.....	13,534		10,863	237,460	15,467	316,623
Pyrites used.....	44,398		19,844	143,778	15,961	81,868
Acid made.....	82,811		55,902	1,290,785	69,281	1,389,716
IMPORTS of acid.....	320	22,664	94	10,653	2,687	47,707
EXPORTS of acid.....	5,217	89,992	2,759	55,775	1,490	29,129

*Expressed in terms of 66° Bé acid. Record includes a small production of oleum and other grades, the strength of which is not specified. An approximate estimate of production in terms of 50° acid will be obtained by increasing these figures by 50 per cent.

QUARTZ

The output of quartz (silica) in Canada during 1922 amounted to 125,245 tons as compared with 97,260 tons in 1921. Shipments during the year totalled 109,947 tons, an increase of 9.5 per cent over those for the previous twelve months. The average selling price per ton was, by grades; crude, \$1.62; and crushed, \$5.05.

The quartz grinding plant at St. Canut, Quebec, owned by Silico, Limited, was in operation during the year. This plant grinds potsdam sandstone and markets a fine grade of silica sand which compares favourably with imported material from Illinois and Michigan. The average price of imported United States silica sand to consumers in Central Ontario was approximately \$5.65 per ton in 1922.

Table 158.—Production of Quartz in Canada, 1890-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1890.....	200	1,000	1907.....	56,585	124,148	1917.....	216,288	496,182
1891-2.....			1908.....	44,741	52,830	1918.....	268,155	629,813
1893.....	100	500	1909.....	56,924	71,285	1919.....	94,991	527,635
1894-5.....			1910.....	88,205	91,951	1920.....	128,295	467,821
1896.....	10	50	1911.....	60,526	83,865	1921.....	100,350	312,947
1897.....			1912.....	100,242	195,216	1922.....	109,947	208,598
1898.....	284	570	1913.....	78,261	169,842			
1899.....	600	1,260	1914.....	54,148	84,583	Total.....	1,771,081	4,042,240
1900-1905.....			1915.....	127,108	205,153			
1906.....	48,376	65,765	1916.....	136,745	251,226			

Table 159.—Production in Canada, and Imports of Quartz, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Quebec.....	1,986	5,558	5,994	29,824	10,994	53,023
Ontario.....	90,433	321,063	72,068	220,806	81,528	118,054
British Columbia.....	35,876	141,200	22,288	62,317	17,425	37,521
Total	128,295	467,821	100,350	312,947	109,947	208,598
IMPORTS—						
Silex.....	1,154	26,097	1,211	36,041	1,058	25,248
Flint.....	9,047	170,355	5,061	84,761	6,633	92,094

SALT

The output of salt from all sources in Canada during 1922 totalled 183,438 tons, of which quantity approximately 99 per cent or 181,794 tons valued at \$1,628,323 was marketed. Compared with the sales for the previous year, the 1922 records show d an increase of 17,136 tons or 19.4 per cent in quantity and a decrease of \$45,362 or 2.7 per cent in value.

Ontario continued to be the chief producer contributing 97.2 per cent of the total sales. Nova Scotia shipments, from the Malagash mine, amounted to 5,053 tons of common coarse, land and rock salt.

Table 160.—Production of Salt in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1886.....	62,359	227,195	1899.....	59,339	254,390	1912.....	95,053	459,582
1887.....	60,173	166,394	1900.....	62,055	279,458	1913.....	100,791	491,280
1888.....	59,070	185,460	1901.....	59,428	262,328	1914.....	107,038	493,048
1889.....	32,832	129,547	1902.....	64,456	292,581	1915.....	119,900	600,226
1890.....	43,754	198,857	1903.....	62,452	297,517	1916.....	132,903	717,053
1891.....	45,621	161,179	1904.....	69,477	321,778	1917.....	138,909	1,047,792
1892.....	45,486	162,041	1905.....	67,340	320,858	1918.....	131,727	1,285,039
1893.....	62,324	195,926	1906.....	76,720	329,130	1919.....	148,301	1,397,929
1894.....	57,199	170,687	1907.....	72,697	342,515	1920.....	209,855	1,544,724
1895.....	52,376	160,455	1908.....	79,975	378,798	1921.....	164,658	1,073,685
1896.....	43,960	169,693	1909.....	84,037	415,219	1922.....	181,794	1,628,324
1897.....	51,348	225,730	1910.....	84,092	409,624			
1898.....	57,142	248,639	1911.....	91,582	443,004	Total	3,137,623	18,088,685

Table 161.—Production of Salt in Canada, by Grades, 1921 and 1922

	1921				1922			
	Quantity Manufactured	Quantity Sold	Value of Salt Sold (Not including packages)	Stocks on hand at end of Year	Quantity Manufactured	Quantity Sold	Value of Salt Sold (Not including packages)	Stocks on hand at end of Year
	Tons	Tons	\$	Tons	Tons	Tons	\$	Tons
Table and dairy.....	40,992	40,961	755,721	31	41,274	41,119	837,994	681
Common fine.....	41,398	36,074	455,204	6,526	35,758	34,684	329,475	6,853
Common coarse.....	33,442	30,905	327,279	3,935	28,096	28,580	282,336	3,703
Land salt.....	3,246	3,197	39,071	119	6,964	6,875	38,840	184
Other grades.....	3,017	2,989	27,713	28	7,636	6,826	72,621	547
Brine for chemical works (Salt equivalent sold or used).....	50,532	50,532	68,697	.....	63,710	63,710	67,058	.....
Total	172,627	164,658	1,673,685	10,639	183,438	181,794	1,628,324	11,968

Table 162.—Imports, Exports and Consumption of Salt in Canada, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
PRODUCTION.....	209,855	\$ 1,544,724	164,658	\$ 1,673,685	181,794	\$ 1,628,324
IMPORTS—						
Fine, in bulk ¹	54,338	356,389	45,677	294,543	61,913	321,380
In bags, barrels ²	33,615	446,671	33,531	455,962	51,772	596,513
All other ³	67,693	631,627	50,515	274,763	82,185	355,890
Total imports.....	155,646	1,434,687	129,723	1,025,268	195,870	1,273,783
EXPORTS.....	303	9,181	348	7,584	740	10,053
CONSUMPTION OF SALT ⁴	365,798	2,970,230	294,033	2,691,369	376,924	2,892,054

¹Duty 5 cents per 100 pounds: ²Duty 7½ cents per 100 pounds: ³Free—Imported for use of sea or gulf fisheries. ⁴Sum of production and imports, less exports.

SODIUM CARBONATE

The Lillooet Soda Company, Ltd., shipped some 202 tons of sodium carbonate crystals during 1922 as compared with shipments of 197 tons in 1921. These shipments were made from a deposit located near Clinton, Lillooet District, British Columbia. The production of soda ash from salt brine is now carried on in Canada on a very large scale.

This material is used in the manufacture of glass, soap and paper, for bleaching and washing linen, cotton, wool, etc.; dyeing and printing fabrics; preventing the formation of boiler scale and also to a small extent as a reagent in analytical chemistry.

SODIUM SULPHATE

Natural deposits of sodium sulphate in the province of Saskatchewan were operated during 1922. The total quantity of natural sodium sulphate sold during the year amounted to 504 tons valued at \$11,980 as against 624 tons at \$18,850 in the previous twelve months. The average prices per ton obtained by operators were: crude, \$6.70; and refined, \$32.

In the following table data showing the production of both natural and artificial sodium sulphate have been compiled.

Table 163.—Production and Imports of Sodium Sulphate, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
PRODUCTION—		\$		\$		\$
Natural Sodium Sulphate—						
Crude.....	811	19,496	112	1,824	164	1,100
Refined.....			512	17,026	340	10,880
Artificial Sodium Sulphate—						
Sodium sulphate.....	5,524	111,983	2,418	54,804	2,583	59,804
Glauber's salt.....	1,781	50,336	1,239	42,719	1,905	54,899
IMPORTS—						
Soda, sulphate of, crude, known as salt cake.....	42,974	958,628	27,654	690,311	39,472	830,515
Glauber's salt.....	283	8,364	139	4,521	172	5,554

TALC

Mining and milling operations in the talc industry in Canada were carried on more extensively during 1922 than in the previous years. Some 15,155 tons on rock was milled. Shipments totalling 13,195 tons, consisting entirely of the milled product were made. Similar prices prevailed in the year under review as in 1921, namely; high-grade, \$22; medium \$13; and low-grade, \$9.

The Ontario production was derived from deposits near Madoc in Hastings County. In British Columbia, mining operations were conducted on two deposits—one, at Wolf Creek, in the Victoria Mining Division, and the other, the “Gisby Group,” near Keefers.

The Quebec contribution consisted of shipments of scapstone blocks to sulphate-process pulp mills for use in lining the alkali recovery furnaces.

Table 164.—Production of Talc in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1886.....	50	400	1899.....	450	1,960	1912.....	8,270	23,132
1887.....	100	800	1900.....	1,420	6,365	1913.....	12,250	45,980
1888.....	140	280	1901.....	259	842	1914.....	10,808	40,418
1889.....	195	1,170	1902.....	689	1,804	1915.....	11,885	40,554
1890.....	917	1,239	1903.....	990	2,739	1916.....	13,104	49,423
1891.....			1904.....	840	1,875	1917.....	15,803	76,539
1892.....	1,374	6,240	1905.....	500	1,800	1918.....	18,169	119,197
1893.....	717	1,920	1906.....	1,234	3,030	1919.....	18,642	116,295
1894.....	916	1,640	1907.....	1,534	4,602	1920.....	21,671	166,934
1895.....	475	2,138	1908.....	1,016	3,048	1921.....	10,134	144,565
1896.....	410	1,230	1909.....	4,350	10,300	1922.....	13,195	188,458
1897.....	157	350	1910.....	7,112	22,308			
1898.....	405	1,000	1911.....	7,300	22,100	Total.....	187,481	1,112,675

Table 165.—Production in Canada and Exports of Talc, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Crude.....	11,820	48,939				
Refined.....	9,851	117,995	10,134	144,565	13,195	188,458
Total.....	21,671	166,934	10,134	144,565	13,195	188,458
EXPORTS.....		263,708	7,115	112,724	9,854	143,938

STRUCTURAL MATERIALS AND CLAY PRODUCTS

The resumption of activities in the building and construction industries in Canada during 1922 was reflected in the increased value of structural materials produced. During the year the total value of structural materials and clay products marketed was \$39,534,741 as compared with \$34,737,428 in 1921, an advance of \$4,797,313 or 13·8 per cent. The principal increases in the value of production were, by industries: cement, 8·76 per cent; clay products, 29·13 per cent; lime, 13·80 per cent; and sand and gravel 38·06 per cent. The sales of stone and slate declined 33·39 per cent and 5·82 per cent respectively.

Contracts awarded for building and construction work during 1922 were evaluated at \$331,843,800, an increase of \$91,710,500 or 29·5 per cent over the figures for the preceding year. Building and construction in Ontario, to the value of \$166,628,000 was undertaken during the year. This province accounted for approximately fifty per cent of the total for the Dominion. On the basis of total values of contracts awarded, the other provinces ranked in the following order—Quebec, British Columbia, Alberta, Manitoba, Nova Scotia, Saskatchewan, New Brunswick, and Prince Edward Island. Of the grand total for the year, 63·7 per cent or \$211,343,000 represented the value of buildings, such as residences, schools, stores, factories, etc. The construction of roads, streets, sewers and watermains, bridges, etc., and general engineering, accounted for the balance.

Table 166.—Value of Structural Materials and Clay Products produced in Canada, 1921 and 1922

Province	1921	1922
	\$	\$
Nova Scotia.....	553,043	602,109
Prince Edward Island.....	1,433	14,003
New Brunswick.....	391,145	417,559
Quebec.....	9,741,256	11,605,462
Ontario.....	18,615,980	20,259,427
Manitoba.....	1,449,476	1,814,729
Saskatchewan.....	271,280	441,437
Alberta.....	1,890,790	1,845,990
British Columbia.....	1,823,025	2,534,025
Canada.....	34,737,428	39,534,741

Summary statistics of production, imports, exports and consumption relating to this phase of mineral production have been compiled in the subjoined table. Detailed data for each industry are given under the individual sections.

Table 167.—Summary Statistics of Structural Materials and Clay Products, 1920, 1921 and 1922

		Production	Imports	Exports	Consumption
		\$	\$	\$	\$
Cement, portland and puzzolan.....	1920	14,798,070	130,919	2,193,626	12,735,363
	1921	14,195,143	82,615	650,658	13,627,100
	1922	15,438,481	96,310	699,738	14,835,053
Clay and Clay Products.....	1920	10,664,929	9,414,783	358,151	19,721,561
	1921	8,857,818	7,517,222	245,835	16,129,205
	1922	11,438,456	6,654,503	311,048	17,781,911
Lime.....	1920	3,818,553	48,790	381,899	3,485,444
	1921	2,781,197	19,512	247,112	2,553,597
	1922	3,165,005	27,942	270,724	2,922,223
Sand-lime brick*.....	1920	724,918			724,918
	1921				
	1922				
Sand and gravel.....	1920	4,291,067	267,950	193,503	4,365,514
	1921	2,537,249	114,575	201,711	2,450,113
	1922	3,502,935	175,667	116,121	3,562,481
Slate.....	1920	14,200	259,173		273,373
	1921	22,325	267,599		289,924
	1922	14,871	286,095		300,966
Stone.....	1920	7,580,351	1,217,216	102,988	8,694,579
	1921	6,343,696	927,694	57,924	7,213,466
	1922	5,974,993	937,726	134,252	6,778,467
Total.....	1920	41,892,088	11,338,831	3,230,167	50,000,752
	1921	34,737,428	8,929,217	1,403,240	42,263,405
	1922	39,534,741	8,178,243	1,531,883	46,181,101

*Statistics of sand-lime brick production have been included among the secondary, or manufacturing industries since 1921, as both sand and lime are reported under primary production.

CEMENT

The sales of cement in Canada in 1922 of 6,943,972 barrels exceeded those of the previous year by 1,191,087 barrels. The total mill output amounted to 6,447,696 barrels, a decrease of 1,960 barrels from the 1921 total. No puzzolan cement was produced during the year.

Eleven plants, having in all a daily capacity of 35,338 barrels, were operated during the year. In addition to these, there were at least twelve other plants in Canada which were idle during the whole period.

Ontario and Quebec were the principal producing provinces; sales from the former amounted to 3,104,386 barrels averaging \$2.06 per barrel and from the latter 2,660,935 barrels at an average price of \$2.22. The average selling price f.o.b. plant in the other provinces was as follows: Manitoba, \$2.62; Alberta, \$2.33; and British Columbia, \$3, with a Dominion average of \$2.22 per barrel.

The consumption of cement in Canada during the year increased approximately nineteen per cent over the quantity used in 1921. It may be noted that the consumption in the twelve months under review was 38 per cent less than recorded for 1913.

Exportations in 1922 totalled 425,137 barrels, an increase of 182,792 barrels or 75 per cent over those for 1921. The value of imports of Portland cement in the current year showed a slight advance to \$83,037.

The Canadian duty on cement from United States is 8 cents per 100 pounds, while a similar rate obtains for exportations to that country. The tariff on cement imported from Great Britain is 5 cents per 100 pounds.

Table 168.—Production of Cement in Canada, 1887-1922

Year	Barrels	Value	Year	Barrels	Value	Year	Barrels	Value
		\$			\$			\$
1887.....	69,843	81,909	1899.....	396,753	633,291	1911.....	5,692,915	7,644,937
1888.....	50,668	35,593	1900.....	417,552	662,910	1912.....	7,132,732	9,106,556
889.....	90,474	69,790	1901.....	450,394	660,030	1913.....	8,658,805	11,019,418
890.....	102,216	92,405	1902.....	722,525	1,127,550	1914.....	7,172,480	9,187,924
891.....	93,479	108,561	1903.....	719,993	1,225,247	1915.....	5,681,032	6,977,024
892.....	117,408	147,663	1904.....	967,172	1,338,239	1916.....	5,369,560	6,547,728
893.....	158,597	194,015	1905.....	1,360,732	1,924,014	1917.....	4,768,488	7,724,246
1894.....	108,142	144,637	1906.....	2,128,374	3,170,859	1918.....	3,591,481	7,076,503
1895.....	128,294	173,675	1907.....	2,441,868	3,781,371	1919.....	4,995,257	9,802,433
1896.....	149,090	201,651	1908.....	2,666,333	3,709,954	1920.....	6,651,980	14,798,070
1897.....	205,213	275,273	1909.....	4,067,709	5,345,802	1921.....	5,752,885	14,195,143
1898.....	250,209	397,580	1910.....	4,753,975	6,412,215	1922.....	6,943,972	15,438,481
Total.....							95,028,600	151,432,697

PRODUCTION OF CEMENT IN CANADA 1887-1922

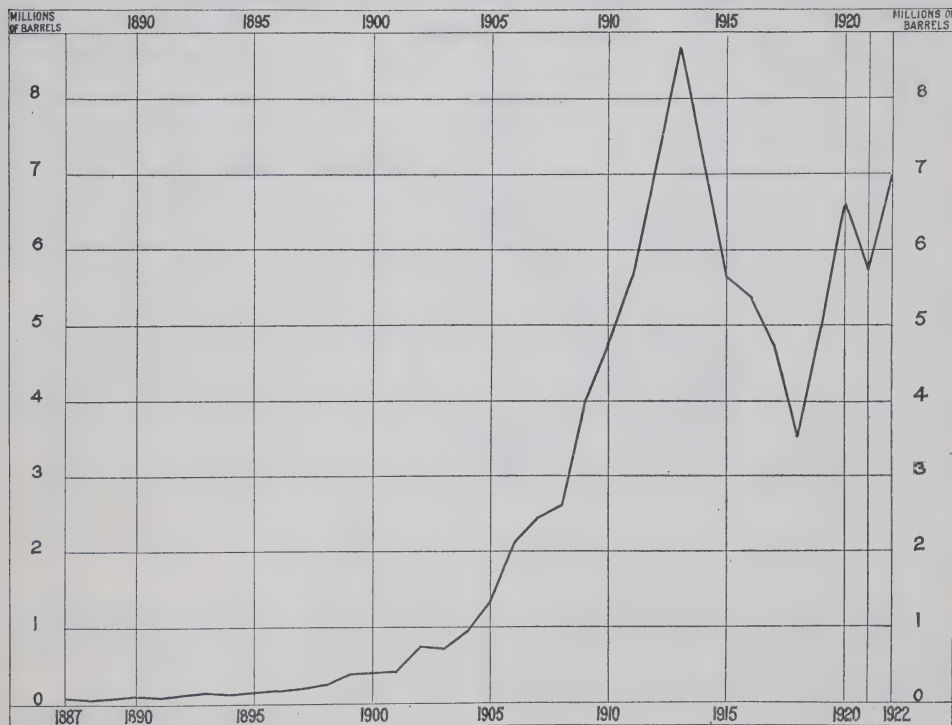
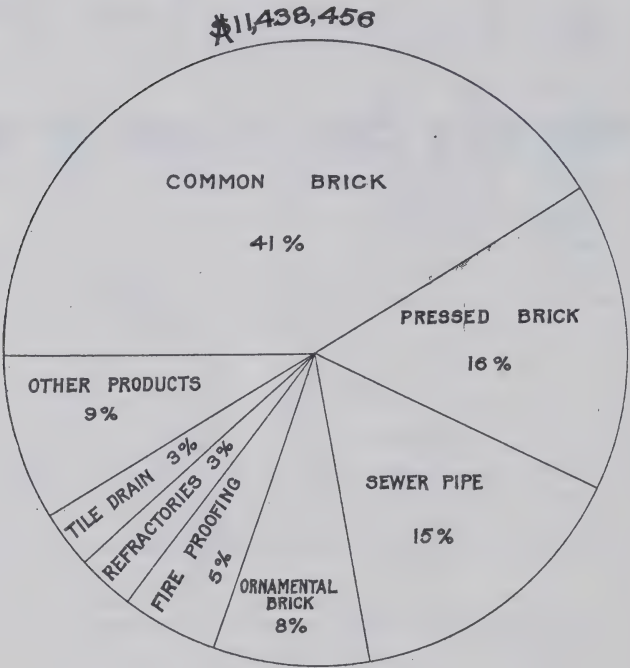


Table 169.—Summary Statistics of Cement in Canada, 1920, 1921 and 1922

	1920		1921		1922	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
Made from Marl.....	(b) 86,171		(b) 10,676			
Made from Limestone.....	6,412,379		6,438,980		6,447,696	
Total made.....	6,498,550		6,449,656		6,447,696	
Sold or used.....	6,651,980	14,798,070	5,752,835	14,195,143	6,943,972	15,438,481
Stocks Dec. 31.....	936,173		1,603,215		1,106,939	
Imports—						
Portland Cement.....	32,963	112,466	12,057	75,670	30,914	83,037
Manufactures.....		18,453		6,945		13,273
Exports.....	(a) 835,667	2,193,626	242,345	650,658	425,137	609,738
CONSUMPTION.....	5,849,276		5,522,597		6,549,749	

(a) Quantity not recorded but estimated at the rate of 75 cents per cwt. or \$2-62½ per barrel.
(b) Including puzzolan.

PRODUCTION IN CANADA OF CLAY PRODUCTS
1922



CLAY AND CLAY PRODUCTS

Under clay and clay products there have been included statistics relating to the production of (a) brick, common, pressed, moulded and ornamental and hollow building brick or blocks; (b) drain-tile and sewerpipe (c) pottery (d) architectural terra cotta (e) kaolin or china clay (f) refractories—fireclay, firebrick, and fireclay blocks and shapes.

The renewed activity in the building industry was reflected in the increased output in this industry during 1922, the total value of production being \$11,438,456 as compared with \$8,857,818 in 1921 and \$10,664,929 in 1920. There was an increase of 29 per cent over the previous year's total and 7 per cent over the records for 1920.

Table 170.—Production in Canada, Imports and Exports of Clay and Clay Products, 1920, 1921 and 1922

		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
			\$		\$		\$
OUTPUT—							
Common brick.....	M	347,016		218,753	3,558,576	315,808	4,817,532
Pressed brick.....	M	102,868		83,165	1,769,840	91,356	1,719,691
SALES—							
Common brick.....	M	303,343	4,835,996	220,438	3,567,503	294,919	4,714,658
Pressed brick.....	M	85,137	2,004,537	80,947	1,738,293	90,578	1,839,549
Fireproofing.....	Tons.	49,091	591,518		462,296		542,611
Hollow building blocks.....	M		302,261	3,627	177,273	4,893	448,674
Kaolin.....	Tons.	683	15,022	124	1,888	1,197	17,866
Ornamental brick.....	M	3,515	73,926	1,995	50,576	41,852	865,664
Paving brick.....	"					151	5,972
Terra-cotta lumber.....			46,743		134,193		188,789
Pottery.....			209,171		231,262		266,391
Refractories—							
Fireclay.....	Tons.	8,321	44,091	2,931	29,851	10,196	55,185
Firebrick.....	M	7,293	375,230	4,502	242,462	6,705	251,776
Other products.....	"		54,792		91,685		67,588
Sewerpipe.....	Tons.	58,887	1,549,090		1,666,584	75,932	1,766,347
Tile, drain.....	M	14,527	562,652		473,952	14,731	407,386
Total.....			10,664,929		8,857,818		11,438,456
IMPORTS—							
Bath brick.....			1,793		1,315		1,043
Building brick.....	M	2,944	94,314	4,269	126,765	7,468	174,321
Building blocks.....			153,250		120,980		79,689
Clays—							
China, ground and unground.....	Tons.	13,445	234,668	8,130	138,775	12,898	173,988
Fire, " " ".....	"	50,611	267,180	31,282	148,059	30,792	138,995
Pipe " " ".....	"		2,804		866		2,864
Other clays.....			145,988		72,451		65,422
Drain tile, unglazed.....			5,744		5,815		692
Drain and sewerpipe.....			30,111		41,107		61,397
Earthen and chinaware.....			5,380,462		5,290,836		4,641,482
Firebrick (a).....			1,388,390		630,132		611,564
Firebrick, n.o.p.....			579,365		445,053		361,338
Magnesite brick.....			446,445		61,728		56,561
Silica brick.....			378,759		229,400		131,517
Paving brick.....	M	2,269	74,515	1,323	41,523	1,766	45,686
Other clay manufactures.....			230,995		162,417		117,952
Total.....			9,414,783		7,517,222		6,664,503
EXPORTS—							
Building brick.....	M	8,073	115,627	2,136	29,778	2,418	31,383
Clay—							
Unmanufactured.....	Cwt.	4,738	2,175	2,095	885	2,589	1,777
Manufactures.....			196,222		80,009		104,933
Earthenware.....			44,127		135,163		172,955
Total.....			358,151		245,835		311,048
CONSUMPTION.....			19,721,561		15,861,580		17,791,911

(a) Duty free, of a kind not made in Canada.

Table 171.— Production of Clay Products in Canada, by Provinces, 1921 and 1922

Province	1921		1922	
	Sold or used	Per cent of total value	Sold or used	Per cent of total value
	\$		\$	
Nova Scotia.....	361,761	4.08	427,643	3.74
Prince Edward Island.....			3,975	0.03
New Brunswick.....	66,600	0.75	75,425	0.66
Quebec.....	1,744,760	19.69	2,494,236	21.81
Ontario.....	5,183,125	58.55	6,944,218	60.71
Manitoba.....	208,982	2.35	210,740	1.84
Saskatchewan.....	166,244	1.87	134,704	1.18
Alberta.....	710,477	8.02	700,063	6.12
British Columbia.....	415,869	4.69	447,452	3.91
Canada.....	8,857,818	100.00	11,438,456	100.00

Common Brick.—The sales of common brick in Canada during 1922 totalled 294,919 thousand valued at \$4,714,658, or an average of \$15.99 per thousand. In 1921, the production was 220,438 thousand at \$3,567,503 with an average selling value for the Dominion of \$16.18 per thousand.

The percentage of common brick sold in each province during the year under review was, Nova Scotia, 3.85; New Brunswick, 0.71; Prince Edward Island, 0.10; Quebec, 34.95; Ontario, 50.47; Manitoba, 3.37; Saskatchewan, 0.73; Alberta, 4.07; and British Columbia, 1.75.

Substantial increases in production occurred in all provinces with the exception of Saskatchewan. Calculated on a percentage basis the advance in sales of common brick in the different provinces was as follows: Nova Scotia, 16%; New Brunswick, 16%; Quebec, 47%; Ontario, 30%; Manitoba, 6%; Alberta, 67%; British Columbia, 40%, while Saskatchewan showed a 43% decrease in sales.

Table 172.—Production of Common Brick, in Canada, by Provinces, 1921 and 1922

Province	1921				1922			
	Manu- factured	Sold or used			Manu- factured	Sold or used		
		Quantity	Value	Per M.		Quantity	Value	Per M.
	M	M	\$	\$	M	M	\$	\$
Nova Scotia.....	9,947	9,817	108,250	11.03	12,233	11,364	131,686	11.59
Prince Edward Island.....					350	300	3,975	13.25
New Brunswick.....	2,500	1,800	26,300	14.61	2,631	2,087	33,425	16.02
Quebec.....	61,851	70,241	1,020,184	14.52	114,670	103,087	1,520,430	14.75
Ontario.....	119,275	114,583	2,025,643	17.68	157,682	148,831	2,614,120	17.56
Manitoba.....	9,759	9,358	169,219	18.08	8,098	9,945	166,023	16.70
Saskatchewan.....	4,666	3,789	50,718	13.39	1,111	2,153	27,058	12.57
Alberta.....	4,554	7,180	103,265	14.38	13,335	11,995	137,184	11.44
British Columbia.....	6,201	3,670	63,924	17.42	5,698	5,157	80,757	15.66
Canada.....	218,753	220,438	3,567,503	16.18	315,808	294,919	4,714,658	15.99

Pressed Brick.—Sales of pressed brick in Canada during 1922 totalled 90,577 thousand valued at \$1,839,549 as compared with 80,947 thousand at \$1,738,293 in the previous twelve months. Ontario was the chief producer of this commodity accounting for 73 per cent of the Dominion total. The other provinces, in order of production ranked as follows: Quebec, Alberta, British Columbia, Saskatchewan and Manitoba.

Increases in Quebec and Ontario of 27.3 per cent and 16.5 per cent, respectively, were responsible for the advance in the total sales for the Dominion. Slight decreases will be noted in the other producing provinces.

Table 173.—Production of Pressed Brick, in Canada, by Provinces, 1921 and 1922

Province	1921				1922			
	Manu- factured	Sold or used			Manu- factured	Sold or used		
		Quantity	Value	Per M.		Quantity	Value	Per M.
	M	M	\$	\$	M	M	\$	\$
Quebec.....	11,571	11,931	251,137	21-05	16,790	15,201	362,556	23-85
Ontario.....	58,884	57,027	1,194,580	20-95	65,479	66,484	1,289,278	19-39
Manitoba.....	1,362	623	22,837	36-66	.....	71	1,768	25-25
Saskatchewan.....	2,455	1,900	56,628	29-80	948	1,101	41,557	37-74
Alberta.....	7,785	8,358	164,049	19-62	6,552	6,619	98,803	14-93
British Columbia.....	1,108	1,108	49,062	44-28	1,586	1,102	45,587	41-37
Canada.....	83,165	80,947	1,738,293	21-47	91,355	90,578	1,839,549	20-31

Table 174.—Production of Building Brick (Common and Pressed), 1886-1906

Year	Value	Year	Value	Year	Quantity	Value
	\$		\$		M	\$
1886.....	873,600	1893.....	1,800,000	1900.....	.....	2,275,000
1887.....	986,689	1894.....	1,800,000	1901.....	.....	2,400,000
1888.....	1,036,746	1895.....	1,670,000	1902.....	.....	2,593,000
1889.....	1,273,884	1896.....	1,600,000	1903.....	.....	2,832,000
1890.....	1,266,982	1897.....	1,600,000	1904.....	.....	2,983,000
1891.....	1,061,536	1898.....	1,900,000	1905.....	523,820	3,933,925
1892.....	1,251,934	1899.....	2,195,000	1906.....	523,390	4,102,590
				Total.....		41,435,886

Table 175.—Production of Common Brick, 1907-1922

Year	M.	Value	Year	M.	Value	Year	M.	Value
		\$			\$			\$
1907.....	439,016	3,455,524	1913.....	668,427	5,917,373	1919.....	291,470	3,850,219
1908.....	353,261	2,611,554	1914.....	457,514	3,653,861	1920.....	303,343	4,835,996
1909.....	539,229	4,212,424	1915.....	234,733	1,755,187	1921.....	220,438	3,567,503
1910.....	627,715	5,105,354	1916.....	237,035	1,826,844	1922.....	294,919	4,714,658
1911.....	645,551	5,420,890	1917.....	210,631	1,999,465			
1912.....	769,192	7,010,375	1918.....	164,970	1,879,811	Total.....	6,457,444	61,817,038

Table 175a.—Production of Pressed Brick, 1907-1922

Year	M.	Value	Year	M.	Value	Year	M.	Value
		\$			\$			\$
1907.....	78,922	794,722	1913.....	116,802	1,458,733	1919.....	74,424	1,304,162
1908.....	53,481	517,180	1914.....	93,635	1,115,556	1920.....	85,137	2,004,537
1909.....	57,265	630,677	1915.....	49,817	492,774	1921.....	80,947	1,738,293
1910.....	67,895	807,294	1916.....	44,947	492,355	1922.....	90,578	1,839,549
1911.....	87,851	1,094,582	1917.....	46,409	653,153			
1912.....	125,180	1,609,854	1918.....	40,147	639,083	Total.....	1,192,937	17,192,504

Moulded and Ornamental Brick.—The total quantity of moulded and ornamental brick produced in Canada during 1922, was 41,852 thousand valued at \$865,664. In Ontario, separate production statements were obtained for (a) moulded and ornamental brick, and, (b) tapestry and rug brick. The former amounted to 234 thousand and the latter 41,206 thousand with average values per thousand of \$35.06 and \$20.54, respectively. The average price for the Dominion was \$20.68 per thousand, ranging from \$20.24 per thousand in Saskatchewan to \$37.32, in Quebec. There was no production of this commodity reported for the provinces of Nova Scotia, New Brunswick, Manitoba and British Columbia.

Table 176.—Production of Moulded and Ornamental Brick in Canada, by Provinces, 1921 and 1922

Province	1921				1922			
	Manu- factured	Sold or used			Manu- factured	Sold or used		
		Quantity	Value	Per M.		Quantity	Value	Per M.
	M	M	\$	\$	M	M	\$	\$
Quebec.....	11	43	1,388	32.28	82	84	3,098	37.32
Ontario.....	2,200	1,878	46,795	24.92	47,440	41,441	854,762	20.62
Saskatchewan.....						76	1,518	20.24
Alberta.....	246	74	2,393	32.34	255	251	6,286	25.04
Canada.....	2,457	1,995	50,576	25.36	47,778	41,852	865,664	20.63

Paving Brick.—In 1922, for the first time in six years, clay paving brick was produced in Canada. The year's sales totalled 150,813 bricks valued at \$5,972, and consisted of paving brick made at Clayburn, British Columbia, from local deposits of clay. The production of this commodity in 1916 amounted to 1,590 thousand with a value of \$30,144. Plants were operated during that year at West Toronto, Ontario, and Clayburn, British Columbia.

Table 177.—Production of Paving Brick*, 1897-1922

Year	Quantity	Value	Year	Quantity	Value	Year	Quantity	Value
	M	\$		M	\$		M	\$
1897.....	4,568	45,670	1905.....	4,500	54,000	1913.....	4,208	75,669
1898.....			1906.....	3,000	45,000	1914.....	2,707	49,627
1899.....	5,300	42,550	1907.....	3,618	72,354	1915.....	1,228	20,694
1900.....	2,710	26,950	1908.....	3,720	59,456	1916.....	1,590	30,144
1901.....	3,689	37,000	1909.....	3,760	67,408	1917-1921.....		
1902.....	4,211	42,000	1910.....	4,215	78,980	1922.....	151	5,972
1903.....	3,789	45,288	1911.....	5,220	79,444			
1904.....	4,436	55,450	1912.....	4,580	85,989	Total.....	71,200	1,019,645

*Figures prior to 1907 compiled by the Ont. Bureau of Mines.

Hollow Building Brick.—The sales of hollow building brick in 1922 amounted to 4,893 thousand valued at \$448,674, as against 3,628 thousand at \$177,273 in the previous twelve months. Ontario shipments increased 232 per cent; Quebec, 17 per cent; Manitoba, 37 per cent; and Saskatchewan, 42 per cent. Decreases were noted in the following provinces: Alberta, 34 per cent and British Columbia, 51 per cent.

For the province of Ontario, separate statistics were obtained of the quantity and value of interlocking tile produced, the records showed sales of 1,410 thousand interlocking tile with an average value of \$122.71 per thousand.

Table 178.—Production of Hollow Building Brick or Blocks, in Canada, by Provinces, 1921 and 1922

Province	1921			1922		
	Manu- factured	Sold or used		Manu- factured	Sold or used	
		Quantity	Value		Quantity	Value
	M	M	\$	M	M	\$
Quebec.....	528	440	36,999	486	515	41,784
Ontario.....	555	607	31,486	2,276	2,017	272,118
Manitoba.....	697	626	16,926	500	860	15,310
Saskatchewan.....	406	281	11,897	450	495	37,550
Alberta.....	1,507	1,061	17,376	1,041	707	40,050
British Columbia.....	794	613	62,589	374	298	41,862
Canada.....	4,517	3,628	177,273	5,127	4,892	448,674

Pottery (a) From Canadian Clay.—Sales of pottery, made from domestic clay during 1922 were valued at \$266,391, an increase of \$21,627 or 9 per cent over previous year's records.

Five firms in Canada produced pottery, (using domestic clay) in the year under review. Stoneware, Rockingham ware, flower pots, etc., were made at St. John, New Brunswick, partly from Nova Scotia clay. Rockingham ware was also produced at Medicine Hat, Alberta, from Saskatchewan clay. Flower pots were produced in the following localities, Medicine Hat, Alberta, from Saskatchewan clay; and Toronto and Hamilton, Ontario, from local clay.

(b) From Imported Clays.—Six firms, using imported clays, operated in the pottery industry in Canada during 1922. Two of these companies were located at St. John's, Quebec and produced sanitary ware from American and English clays. Porcelain insulators were manufactured by two companies, one in Toronto, the other in Hamilton, Ontario. Earthenware was produced by one firm at Iberville, Quebec, and another at Hamilton, Ontario. The total sales of products from imported clays were valued at \$1,186,083, comprising sanitary ware to the value of \$437,346 and porcelain insulators and earthenware worth \$748,737.

The imports of china clay, fire clay, pipe clay, and other clays were appraised at \$381,269, in 1922. Canadian importations of ground or unground china clay from Great Britain totalled 6,888 tons valued at \$85,237; and from United States 6,009 tons, at \$88,717.

Table 179.—Production of Pottery, from Domestic and Imported Clays, in Canada, by Provinces, 1921 and 1922

Province	1921		1922	
	Made from		Made from	
	Domestic Clay	Imported Clay	Domestic Clay	Imported Clay
	\$	\$	\$	\$
New Brunswick.....	40,000		42,000	
Quebec.....		357,571		445,346
Ontario.....	69,984	810,304	88,889	740,737
Alberta.....	121,278		135,502	
Canada.....	231,262	1,167,875	266,391	1,186,083

Table 180.—Production of Pottery in Canada, 1888-1922

Year	Value	Year	Value	Year	Value	Year	Value
	\$		\$		\$		\$
1888.....	27,750	1897.....	129,629	1906.....	150,000	1915.....	64,900
1889.....	*	1898.....	214,675	1907.....	253,809	1916.....	61,069
1890.....	195,242	1899.....	185,000	1908.....	200,541	1917.....	122,878
1891.....	258,844	1900.....	200,000	1909.....	285,285	1918.....	130,242
1892.....	265,811	1901.....	200,000	1910.....	250,924	1919.....	185,474
1893.....	213,186	1902.....	200,000	1911.....	102,493	1920.....	209,171
1894.....	162,144	1903.....	200,000	1912.....	43,955	1921.....	231,262
1895.....	151,588	1904.....	140,000	1913.....	53,533	1922.....	266,391
1896.....	163,427	1905.....	120,000	1914.....	35,371		
						Total.....	5,674,594

*Not available.

Kaolin.—Up to the present date the only deposit of kaolin which has been developed in Canada, is located at Remi d'Amherst, near Huberdeau, Quebec. This deposit was operated during 1922 and 1,197 tons of white clay was shipped. In 1921, shipments were considerably lower amounting only to 124 tons.

In addition to the quantity of kaolin produced 117 tons of fire clay was sold in 1922. A record of these sales has been entered under the section dealing with refractories.

Table 181.—Production of Kaolin in Canada, 1912-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1912.....	20	160	1916.....	1,750	17,500	1920.....	683	15,022
1913.....	500	5,000	1917.....	533	9,594	1921.....	124	1,888
1914.....	1,000	10,000	1918.....	863	19,299	1922.....	1,197	17,866
1915.....	1,300	13,000	1919.....	759	13,744	Total.....	8,729	123,073

Architectural Terra Cotta.—Under this heading there is also included floor and wall tile. The total Canadian production came from Ontario, Quebec, and British Columbia, in the order named. Sales were valued at \$188,789 as compared with \$134,193 in 1921, an increase of \$54,596 or 41 per cent. This advance was due mainly to the increased production of floor tile in Ontario.

Table 182.—Production of Architectural Terra Cotta and Tile, other than Drain, in Canada, by Provinces, 1921 and 1922

Province	1921	1922
	\$	\$
Quebec.....	13,260	19,278
Ontario.....	120,594	169,297
British Columbia.....	339	214
Canada.....	134,193	188,789

Drain Tile and Sewer Pipe.—(a) *Drain Tile*—There was a slight falling-off in the value of drain tile sold in 1922, and sales were valued at \$407,386 as compared with \$473,952 in 1921.

Importations in 1922 of drain tile, unglazed, were evaluated \$692, a considerable decrease from imports in the previous year.

(b) *Sewerpipe*.—The total sales of sewerpipe in 1922 were evaluated at \$1,766,347 as against \$1,666,584 in the previous year. Increases were general throughout the producing provinces in the Dominion and were as follows, Nova Scotia, 14 per cent, Quebec, 5 per cent; Ontario, 4 per cent; Alberta, 5 per cent; and British Columbia, 21 per cent, with an advance of 6 per cent in the total for Canada. Ontario contributed 55 per cent of the total, the other provinces following in the order named—Quebec, Nova Scotia, Alberta and British Columbia.

Imports of drain and sewerpipe as shown by Customs records were valued at \$61,397 in 1922 and at \$41,107 in 1921.

Table 183.—Production of Sewer Pipe in Canada, 1888-1922

Year	Value	Year	Value	Year	Tons	Value
	\$		\$			\$
1888.....	266,320	1900.....	231,525	1912.....		884,641
1889.....	*	1901.....	248,115	1913.....		1,035,906
1890.....	348,000	1902.....	301,965	1914.....		1,104,499
1891.....	227,300	1903.....	317,970	1915.....		799,446
1892.....	367,660	1904.....	440,894	1916.....		716,287
1893.....	350,000	1905.....	382,000	1917.....		783,762
1894.....	250,325	1906.....	530,045	1918.....	36,574	699,774
1895.....	257,045	1907.....	667,100	1919.....	62,821	1,074,146
1896.....	153,875	1908.....	514,362	1920.....	58,887	1,549,090
1897.....	164,250	1909.....	645,722	1921.....		1,666,584
1898.....	181,717	1910.....	774,110	1922.....	75,932	1,766,347
1899.....	161,546	1911.....	812,716	Total.....		20,675,044

* Data not available.

Table 184.—Production of Drain Tile in Canada, 1895-1922

Year	Value	Year	Value	Year	Value	Year	Value
	\$		\$		\$		\$
1895.....	210,000	1902.....	*250,000	1909.....	408,440	1916.....	359,387
1896.....	225,000	1903.....	275,000	1910.....	370,008	1917.....	434,708
1897.....	225,000	1904.....	260,000	1911.....	339,812	1918.....	499,340
1898.....	225,000	1905.....	*260,000	1912.....	357,862	1919.....	616,510
1899.....	225,000	1906.....	290,000	1913.....	338,552	1920.....	562,652
1900.....	225,000	1907.....	260,609	1914.....	366,340	1921.....	473,952
1901.....	250,000	1908.....	298,561	1915.....	355,296	1922.....	407,386
Total.....							9,369,415

* 1895-1906 (inclusive), marketed tile only.

Table 185.—Production of Drain Tile and Sewer Pipe, in Canada, by Provinces, 1921 and 1922

Province	1921		1922			
	Drain Tile | Sewer Pipe		Drain Tile		Sewer Pipe	
	\$	\$	M	\$	Tons	\$
Nova Scotia.....	3,702	213,042	105	3,909	13,174	243,455
Quebec.....	21,362	297,691	318	13,988	12,290	312,737
Ontario.....	397,104	939,463	13,790	368,180	42,679	973,824
Saskatchewan.....	33,000	.....	85	6,200	.....	.....
Alberta.....	3,717	161,952	58	3,480	5,446	170,229
British Columbia.....	15,067	54,436	372	11,629	2,343	66,102
Canada.....	473,952	1,666,584	14,728	407,386	75,932	1,766,347

Refractories (a) Fireclay.—Sales of fireclay or refractory clay sold as such, in Canada during 1922 were valued at \$55,185 as compared with \$29,851 in the previous year. The increase in value was \$25,334 or 45·9 per cent. The provinces of Nova Scotia, Quebec, Ontario, Saskatchewan, Alberta and British Columbia were the producers of this commodity in the current year.

(b) Firebrick.—The production of firebrick in Canada from domestic clay during 1922 amounted to 6,705 thousand valued at \$251,776 as compared with 4,502 thousand at \$242,462 in the previous year. The increase in quantity was 48·9 per cent and in value 3·8 per cent. The province of British Columbia was the chief producer, contributing 72·9 per cent of the Dominion total. Ontario, Nova Scotia and Saskatchewan were the only other provinces producing this commodity.

Imports of firebrick into Canada in 1922 were appraised at \$1,160,980. These importations consisted of magnesite brick, silica brick, firebrick of a kind not made in Canada and firebrick, n.o.p.

(c) Fireproofing and Hollow Porous Blocks.—The production of fireproofing and hollow porous blocks in Canada during 1922 was valued at \$542,611 as compared with \$452,296 in 1921, an increase of \$90,315, or 20 per cent. The percentage of sales during the year by provinces were: Nova Scotia, 0·67 per cent; Quebec, 29·58 per cent; Ontario, 50·61 per cent; Manitoba, 5·10 per cent, and Alberta, 14·04 per cent.

(d) Fireclay Blocks and Shapes.—The total value of fireclay blocks and shapes in 1922 was \$67,588, a decrease of \$24,097 or 26·3 per cent from the sales in the preceding year. Nova Scotia, Quebec and British Columbia were the only provinces in which these commodities were made from domestic clays, but there are also many firms in Canada making firebrick, stove linings, etc., from imported American clays.

Table 186.—Production of Fire Clay in Canada, 1889-1922

Year	Tons	Value \$	Year	Tons	Value \$	Year	Tons	Value \$
		\$			\$			\$
1889.....	400	4,800	1901.....	3,979	5,920	1913.....	3,345	14,018
1890.....			1902.....	2,741	4,283	1914.....	2,171	12,875
1891.....	250	750	1903.....	2,639	3,523	1915.....	2,328	12,065
1892.....	1,991	4,467	1904.....	5,972	17,466	1916.....	9,206	30,767
1893.....	540	700	1905.....	5,088	13,917	1917.....	10,554	49,455
1894.....	539	2,167	1906.....	6,559	18,522	1918.....	8,732	44,351
1895.....	1,329	3,492	1907.....			1919.....	4,600	24,163
1896.....	842	1,805	1908.....	1,984	8,121	1920.....	8,321	44,091
1897.....	2,118	5,759	1909.....	4,405	12,390	1921.....	2,931	29,851
1898.....	670	1,680	1910.....	1,425	5,863	1922.....	10,196	55,185
1899.....	599	1,295	1911.....	7,532	24,128			
1900.....	1,245	4,130	1912.....	6,307	24,343	Total.....	121,518	486,342

Table 187.—Production of Fire Brick and Other Fire-Clay Products in Canada, 1907-1922

Year	Fire brick		Other Fireclay Products	Year	Fire brick		Other Fireclay Products
	Quantity	Value	Value		Quantity	Value	Value
	M	\$	\$		M	\$	\$
1907.....	4,323	113,322	18,000	1915.....	2,896	68,700	29,928
1908.....	2,416	70,429	31,752	1916.....	5,689	147,757	56,038
1909.....	1,059	32,742	33,000	1917.....	8,192	199,171	77,885
1910.....	1,375	29,352	15,000	1918.....	7,192	248,884	111,589
1911.....	2,368	44,122	20,880	1919.....	5,610	268,756	96,435
1912.....	3,430	67,192	34,050	1920.....	7,293	375,230	54,792
1913.....	3,667	86,164	42,556	1921.....	4,502	242,462	91,685
1914.....	2,816	72,299	22,894	1922.....	6,705	251,776	67,588
				Total.....	69,533	2,318,358	803,572

Table 188.—Production of Refractories, in Canada, by Provinces, 1921

Province	Fire clay		Fire brick			Fire clay blocks and shapes	Fire proofing and hollow porous blocks
	Sold or used		Manu- factured	Sold or used			
	Tons	Value		Quantity	Value	Sold or used	Sold or used
	\$	M	M	\$	\$	\$	
Nova Scotia.....	1,183	5,619	830	598	30,992	156	
New Brunswick.....	60	300					
Quebec.....	40	160	12	12	370	53,519	46,802
Ontario.....	463	7,756	992	1,094	62,891	17,782	269,047
Manitoba.....							
Saskatchewan.....	199	1,532	410	304	12,469		
Alberta.....							136,447
British Columbia.....	986	14,484	2,494	2,494	135,740	20,228	
Canada.....	2,931	29,851	4,738	4,502	242,462	91,685	452,296

Table 189.—Production of Refractories, in Canada, by Provinces, 1922

Province	Fire clay		Fire brick			Fire clay blocks and shapes	Fire proofing and hollow porous blocks
	Sold or used		Manu- factured	Sold or used			
	Tons	Value		Quantity	Value	Sold or used	Sold or used
		\$		M	M	\$	\$
Nova Scotia.....	327	1,746	960	567	42,518	675	3,654
New Brunswick.....							
Quebec.....	117	580				41,448	160,471
Ontario.....	275	4,068	948	853	35,064		274,618
Manitoba.....							27,639
Saskatchewan.....	417	3,811	392	396	17,010		
Alberta.....	8,075	32,300					76,229
British Columbia.....	985	12,680	5,436	4,889	157,184	25,465	
Canada.....	10,196	55,185	7,736	6,705	251,776	67,588	542,611

LIME

The production of lime in Canada during 1922 totalled 8,972,971 bushels valued at \$3,165,005 as compared with 6,879,066 bushels at \$2,781,197 in the previous year. The average price obtained for quicklime in the twelve months under review, was 34 cents per bushel, while hydrated lime sold for \$12.15 per ton. There was the customary variation in prices throughout the Dominion, the former product ranging in price from 30 cents in Quebec to 58 cents in British Columbia, and the latter from \$10.45 per ton in British Columbia to \$12.52 in Ontario.

The main increases noted in the sales of lime during the year were, to the building industry, chemical works, pulp mills, and to dealers. Minor decreases were apparent in the quantities sold for consumption in the following industries: smelting, sugar refining and agriculture.

Importations of lime into Canada during the current year, 2,555 tons, were slightly in advance of those in 1921. Exports amounted to 14,330 tons or an increase of 1,608 tons over the previous year's figures.

Table 190.—Production of Lime in Canada, 1886-1922

Year	Value	Year	Bushels	Value	Year	Bushels	Value
	\$			\$			\$
1886.....	283,755	1899 (Estimated).....		800,000	1912.....	8,475,839	1,844,849
1887.....	394,859	1900 ".....		800,000	1913.....	7,558,484	1,609,398
1888.....	339,951	1901 ".....		830,000	1914.....	7,028,582	1,360,628
1889.....	362,848	1902 ".....		892,000	1915.....	5,047,244	1,015,702
1890.....	412,308	1903 ".....		900,000	1916.....	5,493,250	1,091,463
1891.....	251,215	1904 ".....		780,000	1917.....	6,567,170	1,558,487
1892.....	411,270	1905 ".....		750,000	1918.....	6,363,951	1,876,025
1893 (Estimated)...	900,000	1906.....	5,230,406	1,009,177	1919.....	7,147,504	2,316,607
1894.....	900,000	1907.....	4,755,316	974,595	1920.....	9,427,334	3,818,553
1895.....	700,000	1908.....	3,601,468	712,947	1921.....	6,879,066	2,781,197
1896.....	650,000	1909.....	5,592,924	1,132,756	1922.....	8,972,971	3,165,005
1897.....	650,000	1910.....	5,848,146	1,137,079			
1898 (Estimated)...	650,000	1911.....	7,533,525	1,517,599	Total.....		41,574,273

Table 191.—Production of Lime in Canada, by Provinces, 1920,* 1921 and 1922

		Quicklime		Hydrated Lime		Total	
		Sold or used		Sold or used		Sold or used	
		Bushels	Selling value at kiln	Bushels	Selling value at kiln	Bushels	Selling value at kiln
			\$		\$		\$
Nova Scotia.....	1920					201,500	40,300
	1921	25,914	6,085			25,914	6,085
	1922						
New Brunswick.....	1920					701,859	365,030
	1921	562,447	203,084			562,447	203,084
	1922	560,834	187,895			560,834	187,895
Quebec.....	1920					2,108,203	826,044
	1921	1,940,594	754,375	99,857	36,128	2,040,451	790,503
	1922	2,108,513	634,157	150,800	55,642	2,259,313	689,799
Ontario.....	1920					5,109,635	1,962,086
	1921	2,763,062	962,439	767,485	381,749	3,530,547	1,344,188
	1922	3,939,954	1,311,563	1,040,229	455,980	4,980,183	1,767,543
Manitoba.....	1920					605,399	210,984
	1921	413,283	136,375			413,283	136,375
	1922	525,184	163,799			525,184	163,799
Alberta.....	1920					139,433	72,477
	1921	107,083	48,332			107,083	48,332
	1922	129,827	70,992	800	336	130,627	71,328
British Columbia.....	1920					561,305	341,632
	1921	152,998	234,779	46,343	17,851	199,341	252,630
	1922	433,716	254,320	83,114	30,321	516,830	284,641
Canada.....	1920	8,410,334	3,337,267	1,017,000	481,286	9,427,334	3,818,553
	1921	5,965,381	2,345,469	913,685	435,728	6,879,066	2,781,197
	1922	7,698,028	2,622,726	1,274,943	542,279	8,972,971	3,165,005

*Separate statistics not available for Quicklime and Hydrated Lime, by Provinces in 1920.

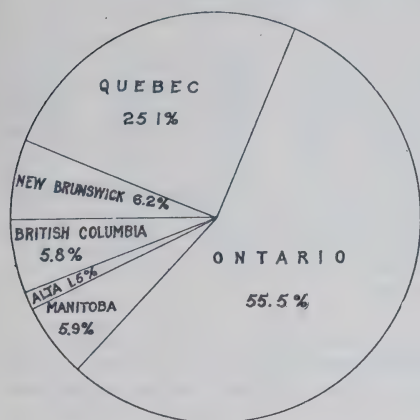
Table 192.—Production of Lime in Canada, 1921 and 1922, showing Purpose for which Sold or Used

Purpose for which sold or used	1921				1922			
	Quicklime		Hydrated lime		Quicklime		Hydrated lime	
	Bushels	Value*	Tons	Value*	Bushels	Value*	Tons	Value*
		\$		\$		\$		\$
Building and whitewashing.....	1,237,158	480,665	26,069	380,042	1,334,769	450,861	34,500	440,433
Chemical works.....	971,387	313,721	746	8,448	1,772,786	605,547	2,194	18,697
Smelters.....	313,827	95,196			169,329	69,450		
Pulp and paper mills.....	1,465,886	541,521	1,523	14,422	2,044,777	498,550	3,173	32,513
Sugar factories.....	371,911	119,081			275,685	100,821		
Tanneries.....	35,845	14,340	1	13	43,979	15,145	3	37
Agricultural uses (fertilizers).....	75,477	11,299	1,814	12,819	38,671	4,450	1,083	10,384
Dealers (uses unspecified).....	801,415	503,830	1,526	16,579	1,363,309	621,493	3,418	37,948
Other purposes.....	692,475	265,816	300	3,405	654,723	256,409	252	2,267
Total sold or used.....	5,965,381	2,345,469	31,979	435,728	7,698,028	2,622,726	44,623	542,279

*Total selling value at kiln.

PRODUCTION OF LIME IN CANADA 1922

BY PROVINCES



BY USES

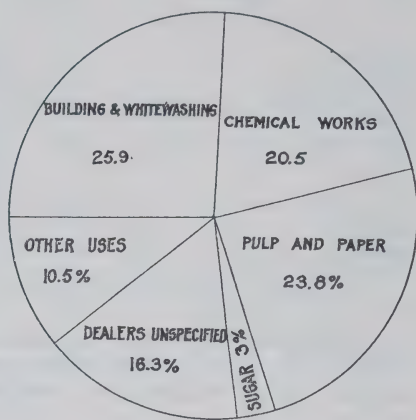


Table 193.—Imports into Canada and Exports of Lime, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
Imports.....	2,739	48,790	1,211	19,512	2,555	27,942
Exports.....	23,016	381,899	12,722	247,112	14,330	270,724

SAND AND GRAVEL

The production of sand and gravel in Canada during 1922 totalled 11,666,374 tons valued at \$3,502,935, an increase of 91,512 tons and \$965,686 over records for the previous year. Statistics for 1921 showed a Canadian production of 11,574,862 tons at \$2,537,249.

Increases over the preceding year, by grades, were as follows: moulding, 67,689 tons; other sands (blast, core and engine), 115,437 tons; sand and gravel for concrete, road-building, etc., 955,558 tons; and crushed gravel 16,251 tons. There was a decrease of 290,974 tons in the sales of building sand and sand for concrete and road-work, etc., and 872,314 tons in sand and gravel for railway ballast.

Imports of sand and gravel into Canada in 1922 were 350,992 tons or 112 per cent above those recorded for 1921. Exports showed a decrease amounting to 713,019 tons.

Table 194.—Production of Sand and Gravel in Canada, 1895-1922*

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		\$			\$			\$
1895.....	277,162	118,359	1905.....	306,935	152,805	1915.....	.....	1,624,767
1896.....	224,769	80,110	1906.....	336,550	139,712	1916.....	8,156,207	1,838,320
1897.....	152,963	76,729	1907.....	298,095	119,853	1917.....	9,182,417	2,326,249
1898.....	165,954	90,498	1908.....	298,954	161,387	1918.....	11,262,282	2,367,018
1899.....	242,450	101,640	1909.....	481,584	256,166	1919.....	10,364,481	2,680,460
1900.....	197,558	101,666	1910.....	624,824	407,974	1920.....	11,530,795	4,201,067
1901.....	197,302	117,465	1911.....	573,494	408,110	1921.....	11,574,862	2,537,249
1902.....	159,793	119,120	1912.....	.....	1,512,099	1922.....	11,666,374	3,502,935
1903.....	355,792	124,006	1913.....	.....	2,258,874			
1904.....	399,809	189,803	1914.....	.....	2,505,310			
						Total.....	.....	30,119,751

*Exports prior to 1912. No production statistics collected.

Table 195.—Production in Canada, Imports and Exports of Sand and Gravel, 1920, 1921 and 1922

Kind	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION—						
Sand.....	1,375,812	935,107	1,755,086	596,980	1,464,112	963,037
Sand and gravel.....	2,103,418	1,354,912	2,635,957	802,133	3,591,515	1,198,156
Crushed gravel.....			70,215	63,454	186,466	117,372
Ballast.....	7,940,700	1,883,833	6,971,874	981,277	6,099,560	1,066,716
Moulding sand.....	44,353	59,271	91,680	70,254	159,369	107,738
All other.....	66,512	57,944	(a) 135 (b) 49,915	100 23,051	165,352	49,916
Total.....	11,530,795	4,291,067	11,574,862	2,537,249	11,666,374	3,502,935
IMPORTS.....	219,398	267,950	165,489	114,575	350,992	175,667
EXPORTS.....	1,491,786	193,503	1,396,728	201,711	683,709	116,121

(a) Glass sand. (b) Other sand including blast, core and engine sands.

Production by Railway Companies.—Statistics relating to the production of sand and gravel by railway companies in Canada have been tabulated separately from data regarding other producers. It will be noted in the table below that 88 per cent of the total output was utilized as railway ballast. In addition to this quantity, 776,151 tons or 11 per cent was produced for use in the road-building and construction industries, although an appreciable quantity was consumed as blast, core and engine sands and a minor amount for moulding purposes.

Table 196.—Railway Production of Sand and Gravel in Canada, 1921 and 1922

Kind	1921		1922	
	Tons	Value	Tons	Value
		\$		\$
Moulding sand.....	240	780	1,500	300
Building sand and sand for concrete road-work.....	31,911	6,270	24,379	9,463
Other sand (including blast, core and engine sands).....	34,829	9,416	20,810	7,732
Sand and gravel for ballast.....	6,847,223	938,643	5,938,794	984,317
Sand and gravel for concrete, road-building, etc.....	782,663	188,816	751,137	128,223
Crushed gravel.....			635	846
Total.....	7,696,866	1,143,925	6,737,255	1,130,886

Production by Other Operators.—Classified under this sub-heading are all sand and gravel operators in Canada other than railway companies. These producers numbered 289, comprising:—Nova Scotia, 11; New Brunswick, 6; Quebec, 11; Ontario, 232; Manitoba, 12; Saskatchewan, 8; Alberta, 4; and 5 in British Columbia.

With the exception of glass sand, considerable increases were recorded in the production of all grades of sand and gravel. The small amounts used in the Yukon were not important, relating only to local construction of foundations, etc.

Table 197.—Production of Sand and Gravel by Other Operators in Canada, 1921 and 1922

Kind	1921		1922	
	Tons	Value	Tons	Value
		\$		\$
Glass sand.....	135	100		
Moulding sand.....	91,440	69,474	157,869	107,433
Building sand and sand for concrete road-work, etc.....	1,723,175	590,710	1,439,733	953,569
Other sand (including blast, core and engine sands).....	15,086	13,635	144,542	42,184
Sand and gravel for railway ballast.....	124,651	42,694	160,766	82,399
Sand and gravel for concrete, road building, etc.....	1,853,294	613,317	2,840,378	1,069,933
Crushed gravel.....	70,215	63,454	185,831	116,526
Total.....	3,877,996	1,393,324	4,929,119	2,372,049

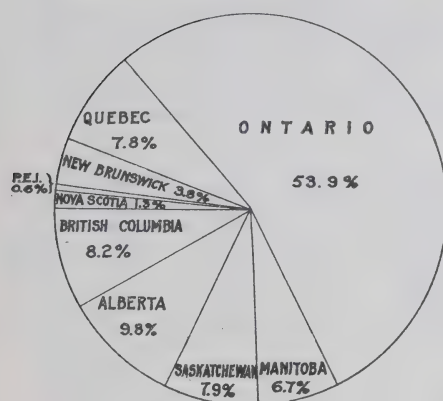
Table 198.—Production of Sand and Gravel in Canada, by Provinces, 1922

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total for Canada
Moulding sand.....Tons	159		1,975	155,940	1,295				159,369
\$	390		417	106,164	767				107,738
Building sand, etc.....Tons	14,656	70,673	43,209	1,178,098	32,175	4,463	6,176	114,662	1,464,112
\$	8,584	8,315	13,206	844,564	13,019	1,945	3,136	70,268	963,037
Other sand.....Tons	480	560	10,031	108,637	6,767	7,315	1,756	29,806	165,352
\$	236	225	3,038	34,723	3,137	1,564	331	6,662	49,916
Sand and gravel—									
(a) for railway ballast..Tons	105,286	338,393	542,730	2,152,598	360,689	884,393	1,096,538	550,513	*6,099,560
\$	28,775	28,907	51,228	322,062	65,647	286,339	191,662	82,068	*1,066,716
(b) for concrete, etc....Tons	27,263	38,696	307,156	2,576,464	378,837	28,773	16,005	232,899	3,591,515
\$	14,645	12,062	89,051	811,502	124,553	16,885	4,766	124,692	1,198,156
Crushed gravel.....Tons	6,177			113,386	468		19,486	32,371	186,466
\$	2,344			65,159	292		29,196	20,381	117,372
Total.....Tons	154,021	448,322	905,101	6,285,123	780,231	924,944	1,139,961	960,251	11,666,374
\$	51,974	49,509	156,940	2,184,174	207,415	366,733	229,091	301,071	3,502,935

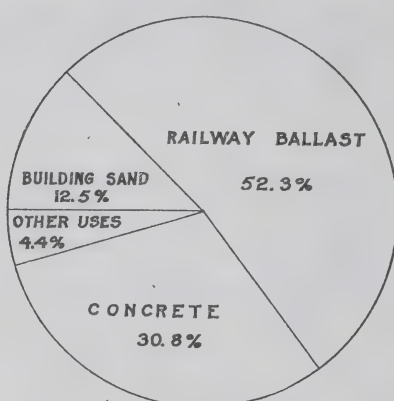
* Includes 68,420 tons valued at \$10,028, used in Prince Edward Island,

PRODUCTION OF SAND AND GRAVEL IN CANADA 1922

BY PROVINCES



BY USES



SAND-LIME BRICK

A record of the production of sand-lime brick in Canada has been included in all previous reports of mineral production, but owing to the fact that statistics relating to this industry will be treated in detail in the report on Non-Metallic Manufactures, only a few notes are included under this section.

The total output of sand-lime brick in 1922 as reported was, 52,749 thousand valued at \$851,007 as compared with 43,457 thousand worth \$662,744 in the previous year. The increase in quantity was, therefore, 9,292 thousand and in value \$188,263.

The province of Ontario was the leading producer accounting for 94 per cent of the total quantity made, and 92 per cent of the value. Manitoba was next in order of production, with 3,800 thousand bricks with a value of \$57,000. A small production was reported from Saskatchewan; the quantity being 500 thousand, valued at \$7,235.

The number of plants active during the year was twelve, comprising nine in Quebec, two in Manitoba, and one in Saskatchewan.

Table 199.—Sand-Lime Brick Manufactured in Canada, by Provinces, 1921 and 1922

Province	1921		1922	
	Quantity	Value	Quantity	Value
	M.	\$	M.	\$
Ontario.....	36,482	534,531	48,449	786,772
Manitoba.....	6,403	116,926	3,800	57,000
Saskatchewan.....	572	11,287	500	7,235
Total.....	43,457	662,744	52,749	851,007

SLATE

The entire production of Canadian slate comes from deposits situated along the south shore of the St. Lawrence river in the province of Quebec. Mining of slate has been carried on in this province since about 1854, the maximum production, 6,935 tons valued at \$119,160 occurring in the year 1889. In 1922 for the first time on statistical record, no roofing slate was produced from the quarries in Melbourne Township, Quebec. The total sales for the year amounting to 1,899 tons valued at \$14,871, consisted of crushed green and red slate, for the manufacture of roofing paper. During 1921, the production amounted to 415 squares of roofing slate valued at \$4,063 and 2,232 tons of crushed slate, valued at \$18,262.

Imports of roofing slate increased 16 per cent over the record for the previous year. School writing slates and slate pencils were also imported in large quantities, while mantles and all other manufactures decreased 18 per cent in value. There were no exports of this commodity.

Table 200.—Production in Canada and Imports of Slate, 1920, 1921 and 1922

	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
PRODUCTION—						
Roofing.....Squares	1,532	12,362	415	4,063		
Crushed.....Tons	240	1,838	2,232	18,262	1,899	14,871
IMPORTS—						
Roofing.....Squares	7,114	73,651	5,725	74,385	6,640	67,035
School-writing.....		76,594		93,589		112,885
Pencils.....		19,161		9,462		17,330
Mantles and manufactures of slate, n.o.p.		89,767		90,163		73,974
Total.....		250,173		267,599		271,224

STONE

The sales of stone in Canada during 1922 totalled 3,639,081 tons valued at \$5,989,864 as against 3,671,498 tons at \$6,343,696. The percentage of decrease in quantity was only 1 per cent and in value 6 per cent.

Building stone, rough and dressed, increased appreciably due mainly to the advance in production of limestone of both grades. Monumental and ornamental stone production was also greater and increases were noted in the output of flagstone, curbstones and paving blocks. Limestone for fluxing material increased 4 per cent and for chemical works, etc., 14 per cent. Rubble and riprap increased 156 per cent. Crushed limestone, granite, marble and sandstone decreased 7 per cent, thus accounting for the slight falling-off in the total sales for the year.

The kinds of stone quarried included granite (trap-rock, syenite and other igneous rocks), limestone, sandstone, and marble. The quantity of limestone quarried and used in the manufacture of lime by the operator was not included under this industry. Only the quantity and value of the lime produced is recorded in order to avoid duplication of entries under mineral production.

Table 201.—Production of Limestone and Sandstone in Canada*, 1909-1922

Year	Limestone	Sandstone	Year	Limestone	Sandstone	Year	Limestone	Sandstone
	\$	\$		\$	\$		\$	\$
1909.....	2,139,691	374,179	1914.....	2,672,781	487,140	1919.....	3,074,815	86,577
1910.....	2,249,576	502,148	1915.....	2,312,081	249,336	1920.....	5,665,693	165,149
1911.....	2,594,926	451,183	1916.....	2,244,091	146,244	1921.....	5,155,046	78,036
1912.....	2,762,936	329,352	1917.....	2,283,659	261,256	1922.....	4,175,941	80,908
1913.....	3,204,091	396,782	1918.....	2,342,403	102,750	Total.....	42,857,730	3,711,040

*Data not available prior to 1909.

Table 202.—Production of Granite and Marble in Canada, 1886-1922

Year	Granite	Marble	Year	Granite	Marble	Year	Granite	Marble
	\$	\$		\$	\$		\$	\$
1886.....	63,909	9,900	1899.....	90,542	.....	1912.....	1,373,119	260,764
1887.....	142,506	6,224	1900.....	80,000	.....	1913.....	1,653,791	249,975
1888.....	147,305	3,100	1901.....	155,000	.....	1914.....	2,176,602	132,533
1889.....	79,624	980	1902.....	210,000	.....	1915.....	1,525,553	158,027
1890.....	65,985	10,776	1903.....	200,000	.....	1916.....	1,247,267	118,810
1891.....	70,056	1,752	1904.....	150,000	.....	1917.....	639,412	55,820
1892.....	89,326	3,600	1905.....	226,305	.....	1918.....	590,871	550
1893.....	94,393	5,100	1906.....	278,419	.....	1919.....	850,563	213,982
1894.....	109,936	.....	1907.....	194,712	.....	1920.....	1,508,916	240,593
1895.....	84,838	2,000	1908.....	282,320	125,000	1921.....	937,894	172,720
1896.....	106,709	2,405	1909.....	454,824	158,441	1922.....	1,486,250	231,894
1897.....	61,934	.....	1910.....	739,516	158,779	Total.....	19,369,335	2,486,508
1898.....	81,073	.....	1911.....	1,119,865	162,783			

Table 203.—Production of Stone in Canada, by Provinces, showing Purposes for which used, 1921

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Total for Canada
Building—								
Rough..... Tons	2,549	.....	23,098	6,080	2,853	2,962	4,940	42,482
Dressed..... Tons	14,006	800	108,120	14,672	20,992	13,750	44,960	216,500
..... \$	.....	4,500	13,172	1,054	.....	.....	.....	15,026
..... \$	.....	.....	379,610	11,953	.....	.....	.....	396,063
Monumental and ornamental—								
Rough..... Tons	550	3,114	3,057	1,951	.....	.....	.....	8,672
Dressed..... Tons	12,664	36,918	38,891	14,372	.....	.....	.....	102,845
..... \$	75	55	1,371	73	.....	.....	130	1,704
..... \$	1,893	9,975	119,513	3,801	.....	.....	14,500	149,682
Flagstone..... Tons	.....	200	.....	30	.....	.....	.....	230
..... \$	.....	4,800	.....	552	.....	.....	.....	5,352
Curbstone..... Tons	.....	141	1,253	.....	304	.....	.....	1,698
..... \$	.....	2,128	6,434	.....	802	.....	.....	9,364
Paving blocks..... Tons	.....	1,351	6,317	7,677	.....	.....	.....	15,345
..... \$	.....	15,321	181,698	51,682	.....	.....	.....	248,701
Limestone, for flux..... Tons	41,974	.....	1,000	55,742	.....	.....	30,604	129,320
..... \$	51,776	.....	700	145,064	.....	.....	36,111	233,651
Limestone for sugar factories, chemical works, etc. Tons	.....	.....	50,354	64,264	.....	.....	3,212	117,830
Rubble and riprap..... Tons	.....	.....	46,068	83,190	.....	.....	6,425	135,683
..... \$	2,700	.....	20,964	23,478	4,332	.....	1,512	52,986
..... \$	4,085	.....	21,632	21,089	9,860	.....	1,512	58,178
Crushed..... Tons	11,075	9,464	598,913	2,555,731	9,379	.....	101,643	3,286,205
..... \$	32,178	23,648	759,975	3,821,207	25,012	.....	125,657	4,787,677
Total..... Tons	58,923	15,125	719,499	2,716,080	16,868	2,962	142,041	3,671,498
..... \$	116,602	97,290	1,662,641	4,167,582	56,666	13,750	229,165	6,343,696
Per cent of Total..... Quantity	1.60	0.41	19.60	73.98	0.46	0.08	3.87	100.00
..... Value	1.84	1.53	26.21	65.70	0.89	0.22	3.61	100.00

Table 204.—Production of Stone in Canada, by Provinces, Showing Purposes for which used, 1922

		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Total for Canada
Building—									
Rough.....	Tons	1,380	319	30,981	47,340	1,250		1,700	82,970
	\$	7,888	3,624	86,486	58,526	14,960		17,500	188,984
Dressed.....	Tons		605	27,931	2,196	2,000	54		32,786
	\$		9,494	743,506	19,360	57,623	4,300		834,283
Monumental and Ornamental—									
Rough.....	Tons	275	1,121	2,992	217			8,280	12,885
	\$	2,664	29,730	86,808	6,198			39,328	164,728
Dressed.....	Tons	150	263	11,379	624	200		1,747	14,363
	\$	13,200	38,985	112,253	17,076	641		50,507	232,662
Flagstone.....	Tons			800	273				1,073
	\$			7,948	634				8,582
Curbstone.....	Tons		386	5,355	946			200	6,887
	\$		4,087	36,230	6,717			3,000	50,034
Paving blocks.....	Tons		140	16,512	20,215				36,867
	\$		3,036	177,699	222,385				403,120
Limestone, for flux.....	Tons	66,892		1,476	32,849			33,204	134,421
	\$	51,536		3,958	34,213			37,990	127,697
Limestone for sugar factories, chemical works, etc.....	Tons	172		40,712	91,060			2,562	134,506
	\$	1,400		51,447	108,550			5,393	166,790
Rubble and riprap.....	Tons	5,728		14,807	67,524	11,178	500	36,288	136,025
	\$	10,179		13,626	62,179	11,495	3,000	26,984	127,463
Crushed.....	Tons	13,358	9,193	834,410	2,054,021	19,728		113,689	3,044,399
	\$	32,625	15,774	1,022,355	2,434,088	21,919		143,889	3,670,650
Total.....	Tons	87,955	12,027	987,355	2,317,265	34,356	554	197,670	3,637,182
	\$	119,492	104,730	2,342,316	2,969,926	106,638	7,300	324,591	5,974,993
Per cent of Total.....	Quantity	2.5	0.3	27.2	63.7	0.9	0.0	5.4	100.0
	Value	2.0	1.8	39.2	59.7	1.8	0.1	5.4	100.0

Table 205.—Production of Stone in Canada, by Kinds and by Provinces, 1921

Province	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Nova Scotia.....	11,822	47,101	44,269	55,436			2,832	14,065
New Brunswick.....	14,325	92,790					800	4,500
Quebec.....	19,608	378,021	679,446	1,072,572	1,650	172,720	18,795	39,328
Ontario.....	165,418	233,353	2,547,625	3,927,836			3,037	6,393
Manitoba.....			16,868	56,666				
Alberta.....							2,962	13,750
British Columbia.....	108,225	186,629	33,816	42,536				
Canada.....	319,398	937,894	3,822,024	5,155,046	1,650	172,720	28,426	78,036

Table 206.—Production of Stone in Canada by Kinds and by Provinces, 1922

Province	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Nova Scotia.....	12,725	44,489	68,122	56,936			7,108	18,067
New Brunswick.....	11,389	95,352					638	9,378
Quebec.....	88,169	665,406	884,311	1,420,223	1,912	231,894	12,963	24,793
Ontario.....	185,738	412,995	2,128,769	2,547,561			2,758	9,370
Manitoba.....			34,356	106,638				
Alberta.....							554	7,300
British Columbia.....	159,904	268,008	36,566	44,583			1,200	12,000
Canada.....	457,925	1,486,250	3,152,124	4,175,941	1,912	231,894	25,221	80,908

Table 207.—Production of Stone in Canada by Kinds, showing Purposes for which used, 1921

	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Building—								
Dressed.....	4,660	21,926	8,883	229,337	683	140,300	800	4,500
Rough.....	9,869	93,913	26,694	67,076	472	27,363	5,447	28,148
Monumental and ornamental—								
Rough.....	8,672	102,845						
Dressed.....	1,680	148,574	24	1,108				
Flagstone.....	200	4,800	6	103			24	449
Curbstone.....	1,141	4,378	557	4,986				
Paving blocks.....	13,770	214,770	1,280	31,603			295	2,328
Limestone, for flux.....			129,320	233,651				
Limestone for sugar factories, chemical works, etc.....			117,830	135,683				
Rubble and riprap.....	1,512	1,512	48,114	51,055			3,360	5,611
Crushed.....	277,894	345,176	2,989,316	4,400,444	495	5,057	18,500	37,000
Total.....	319,398	937,894	3,322,024	5,155,046	1,650	172,720	28,426	78,036

Table 208.—Production of Stone in Canada by Kinds, showing Purposes for which used, 1922

	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$		\$
Building—								
Rough.....	1,681	17,351	78,125	124,560	471	25,861	2,693	21,212
Dressed.....	5,479	208,229	25,613	410,281	1,115	203,419	579	12,354
Monumental and ornamental—								
Rough.....	12,821	164,660	64	68				
Dressed.....	14,131	230,987	232	1,675				
Flagstone.....	800	7,948	235	326			38	308
Curbstone.....	941	11,417	5,000	31,900			946	6,717
Paving blocks.....	36,404	398,952					463	4,168
Limestone, for flux.....			134,421	127,697				
Limestone for sugar factories, chemical works, etc.....			134,506	166,790				
Rubble and riprap.....	37,608	27,314	90,415	84,625			8,002	15,524
Crushed.....	348,060	419,392	2,683,513	3,228,019	326	2,614	12,500	20,625
Total.....	457,925	1,486,250	3,152,124	4,175,941	1,912	231,894	25,221	80,908

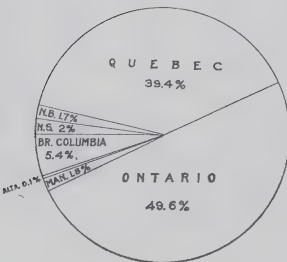
Table 209.—Production, Imports and Exports of Stone, by Kinds and by Provinces, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
PRODUCTION, BY KINDS—						
Granite.....		1,508,916	319,398	937,894	457,925	1,486,250
Limestone.....		5,665,693	3,322,024	5,155,046	3,152,124	4,175,941
Marble.....		240,593	1,650	172,720	1,912	231,894
Sandstone.....		165,149	28,426	78,636	25,221	80,908
Total.....		7,580,351	3,671,498	6,343,696	3,637,182	5,974,993
PRODUCTION, BY PROVINCES—						
Nova Scotia.....		420,175	58,923	116,602	87,955	119,492
New Brunswick.....		280,167	15,125	97,290	12,027	104,730
Quebec.....		2,189,325	719,499	1,662,641	987,355	2,342,316
Ontario.....		4,035,478	2,716,080	4,167,582	2,317,265	2,969,926
Manitoba.....		374,286	16,868	56,666	34,356	106,638
Alberta.....		4,415	2,962	13,750	554	7,300
British Columbia.....		276,505	142,041	229,165	197,670	324,591
Canada.....		7,580,351	3,671,498	6,343,696	3,637,182	5,974,993
IMPORTS—						
Building stone.....		346,082		297,292		371,490
Granite.....		161,024		71,245		72,693
Marble.....		475,030		429,512		294,206
Refuse stone.....	461,813	235,078	236,024	129,645	328,679	199,397
Total.....		1,217,214		927,694		937,726
EXPORTS—						
Crushed.....	41,972	55,994	2,324	8,648	126,063	80,544
Ornamental, rough*.....	1,729	16,941	1,123	13,343	2,666	32,474
Building, rough†.....	9,612	16,246	3,523	8,996	2,357	13,364
Dressed.....		13,807		26,937		7,870
Total.....		102,988		57,924		134,252

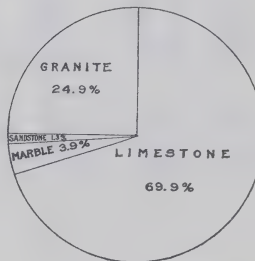
*Granite, marble, etc., unwrought. †Freestone, limestone, etc., unwrought.

PRODUCTION OF STONE IN CANADA IN 1922.

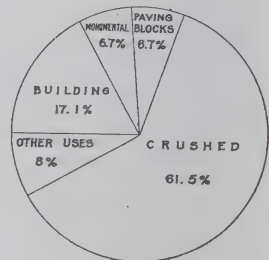
BY PROVINCES



BY KINDS



BY USES



PART TWO

GENERAL STATISTICS

Supplementing the statistics reported in Part One, general reviews have been prepared showing for each principal group in the mineral industry of Canada, statistics of capital employed, number of employees, salaries and wages paid, fuel used, and miscellaneous operating expenses incurred. General tables present the principal statistics of the industry as a whole, as well as by groups, and by provinces. There are separate sections each dealing with the general statistics pertaining to a particular industrial group, as the copper-gold-silver industry, nickel-copper industry, asbestos industry, etc. Supplementing these is a section on metallurgical works, with a review of the processes used in typical Canadian mills in the several divisions of the industry.

GENERAL STATISTICS

INTRODUCTORY REVIEW

In those enterprises which carry on both mining and milling, in the concentrating, amalgamating and cyaniding mills of the gold mining industry, the large reduction works at Cobalt, and such metallurgical operations as the amalgamation of placer gold, it has been found impossible to make a separation of data regarding mining as distinct from metallurgical operations, and the survey which follows covers generally the mining and milling industry. In a later section the smelting and refining industry is described and that section covers those industries which smelt ores either by fire or electrical means.

The principal statistics for the year 1922 are shown under the three main headings Metallics, Non-Metallics, and Structural Materials and Clay Products. In the section on metallics, the net values given to ore shipped by the mines, were in many cases nominal and were made up from book values used by the companies in crediting the mining part of their enterprises. For instance, it was found in the copper-gold-silver section that in some important cases the ores shipped from the mines were valued at much lower figures than the metal contents would indicate. It must also be pointed out that the value of the products shown in the metallurgical section is approximate only, since absolute figures for cost of ores, etc., treated, could not be obtained.

The values of the metallic production as given in these tables are approximately one million dollars less than the figures given in the first part of this report, which were computed values calculated from average prices prevailing in world markets, while the data shown in these tables indicate more nearly the actual return to the different industries.

VALUE OF PRODUCTS, TOTAL EXPENDITURE AND GROSS PROFITS
BY PRINCIPAL MINING INDUSTRIES IN CANADA
1922

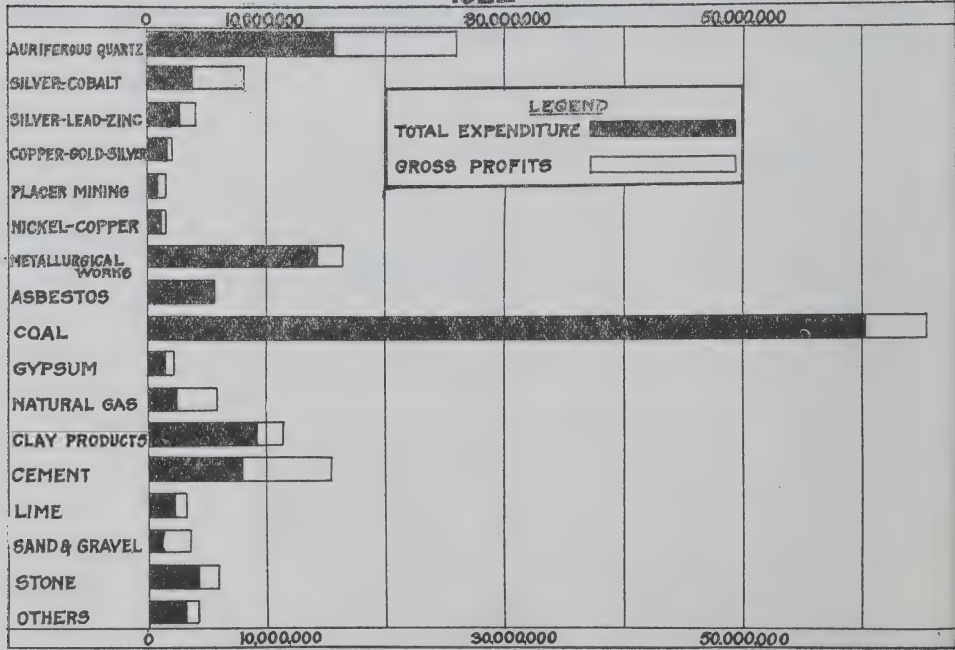


Table 210.—Summary of Principal Statistics Relative to the Mining, Metallurgical, Structural Materials and Clay Products Industries, Operating Plants in Canada, 1922

	Number of active operat-ors	Number of operat-ing plants or mines	Capital employed	Number of Em-ployees	Salaries and wages paid	Miscel-laneous expenses	Cost of fuel	Total expendi-tures	Net value of bullion, ore, concen-trates or residues shipped from the mines, and products made by the smelters
			\$		\$	\$	\$	\$	\$
<i>Metallics—</i>									
Auriferous quartz min-ing and milling.....	79	79	* 35,368,094	5,441	8,011,682	7,383,516	353,453	15,748,651	26,082,169
Silver-cobalt mining and milling.....	26	30	29,459,603	1,403	1,532,736	2,271,186	98,242	3,902,164	8,222,303
Silver-lead-zinc min-ing and milling.....	75	91	6,828,980	994	1,371,645	1,150,595	83,530	2,605,770	4,173,812
Copper-gold-silver mining and milling.....	18	18	6,519,516	826	1,150,275	385,493	77,231	1,612,999	2,031,671
Placer mining.....	200	200	10,703,650	650	670,500			670,500	1,460,347
Nickel-copper mining and milling.....	2	5	8,455,183	440	582,042	608,809	5,828	1,196,679	1,557,414
Iron mining and briquet-ting.....			5,479,766						56,993
Iron blast furnaces.....									106,980
Metallurgical works.....	8	13	63,160,551	3,384	5,042,787	8,140,628	1,031,572	14,214,987	16,465,205
Total.....	408	436	165,975,343	13,138	18,361,667	19,940,227	1,649,856	39,951,750	60,156,894
<i>Non-Metallics—</i>									
Asbestos.....	12	15	43,997,252	2,572	2,581,644	2,704,462	265,962	5,552,068	5,552,723
Coal mining.....	349	402	140,466,108	31,838	39,550,627	17,435,034	3,183,642	60,169,303	65,518,497
Feldspar.....	25	25	388,510	225	127,182	60,829	5,231	193,242	248,402
Fluorspar.....	4	4	323,337	52	25,580	33,588	10,084	69,252	102,138
Gypsum.....	3	5	259,666	40	31,199	25,972	3,351	60,522	43,742
Grindstones.....	13	14	4,092,090	1,055	909,072	436,705	127,246	1,473,023	2,160,898
Magnesite.....	3	3	1,835,938	132	58,578	49,627	7,159	115,364	76,294
Mica.....	20	20	441,802	147	64,641	45,825	1,807	112,273	152,263
Natural gas.....	132	1,981	31,373,817	921	939,194	1,458,675		2,397,869	5,846,501
Oxides, iron.....	4	4	217,428	49	44,839	54,041	16,318	115,198	110,608
Petroleum.....	120	2,880	2,764,099	160	167,176	116,678		283,854	611,176
Quartz.....	9	9	707,180	151	74,412	28,506	27,961	130,879	208,598
Salt.....	10	11	2,205,184	371	432,261	407,105	369,000	1,208,366	1,628,323
Talc.....	7	7	594,019	81	88,509	50,155	2,808	141,472	188,458
All other non-metallic	11	31	3,222,539	164	130,986	61,411	8,215	200,612	528,173
Total.....	742	5,409	232,888,769	37,958	45,225,900	22,968,613	4,028,784	72,223,297	82,976,794
<i>Structural Materials and Clay Products—</i>									
Clay products.....	227	232	31,168,903	4,681	4,752,341	2,487,710	1,969,092	9,209,143	11,438,456
Cement.....	6	11	41,573,737	1,753	2,315,240	2,976,152	2,457,456	7,748,848	15,438,481
Lime.....	57	62	4,984,910	1,110	1,013,486	522,222	725,168	2,260,876	3,165,005
Sand and gravel.....	342	342	4,098,928	750	684,626	445,222	99,069	1,228,917	3,502,935
Stone.....	162	162	13,004,233	2,859	2,673,241	1,259,552	167,139	4,099,932	5,989,864
Total.....	794	809	94,830,711	11,153	11,438,934	7,690,858	5,417,924	24,547,716	39,534,741
<i>Summary by Classes—</i>									
Metallics.....	408	436	165,975,343	13,138	18,361,667	19,940,227	1,649,856	39,951,750	60,156,894
Non-Metallics.....	742	5,409	232,888,769	37,958	45,225,900	22,968,613	4,028,784	72,223,297	82,976,794
Structural materials and clay products...	794	809	94,830,711	11,153	11,438,934	7,690,858	5,417,924	24,547,716	39,534,741
Total.....	1,944	6,654	493,694,823	62,249	75,026,501	50,599,698	11,096,564	136,722,763	182,668,429

1. Excluding capital invested by Consolidated Mining and Smelting Company, Trail; and Kingdon Smelter, Galetta.

2. Excluding capital invested by Granby Consolidated Mining, Smelting and Power Company, Anxox.

3. Estimate. Incorporated companies in Yukon Territory paid \$514,196 in wages; also includes estimate for wages paid in British Columbia.

4. Includes 2 silver smelters South Ontario; 5 plants nickel-copper smelters and refineries in Ontario and Quebec; 6 plants: copper, lead and zinc smelters, Ontario and British Columbia, and refineries in British Columbia and Ontario.

5. Does not include \$200,000 estimated cost of Chemicals.

6. Does not include cost of ores concentrates and residues treated.

7. Represents value of pig iron made from Canadian ore, deducting the net value of ores treated.

8. Includes production of Yukon Territory, 82,394 crude ounces valued at \$16.12 per ounce and production for British Columbia valued at \$364,800.

9. Number of wells.

10. Incorporated companies of Yukon Territory.

11. Includes actinolite, barytes, chromite, corundum, magnesium sulphate, manganese, mineral waters, peat, pyrites odium sulphate, and tripolite.

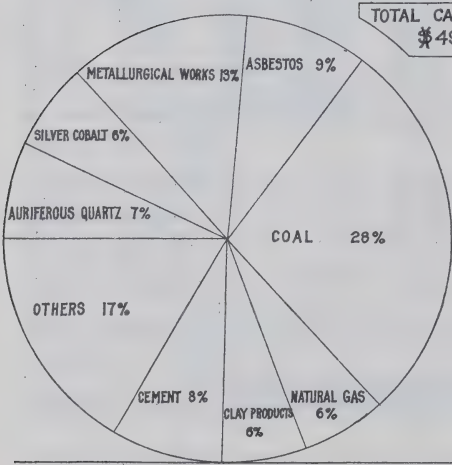
12. Does not include railway ballast operators.

Table 210.—Summary of Principal Statistics Relative to the Mining, Metallurgical, Structural Materials and Clay Products Industries, Operating Plants in Canada, 1922—Concluded

	Number of active operat- ors	Number of operat- ing plants or mines	Capital employed	Number of Em- ployees	Salaries and wages paid	Miscell- aneous expenses	Cost of fuel	Total expendi- tures	Net value of bullion, ore, concen- trates or residues shipped from the mines, and products made by the smelters
			\$		\$	\$	\$	\$	\$
<i>Summary by Provinces—</i>									
Nova Scotia.....	83	121	64,407,944	15,672	13,912,093	8,200,318	1,852,156	23,964,567	
New Brunswick.....	48	84	2,736,220	1,235	1,068,194	427,464	128,498	1,624,156	
Quebec.....	164	169	77,191,610	6,288	6,073,236	5,029,094	1,545,089	12,647,419	
Ontario.....	871	5,429	175,931,022	15,324	18,688,145	19,336,109	4,312,403	42,336,657	
Manitoba.....	32	33	5,714,508	638	651,585	411,367	347,980	1,410,932	
Saskatchewan.....	71	71	4,202,597	587	577,117	126,079	38,170	741,366	
Alberta.....	306	357	65,918,600	10,343	16,131,521	7,273,775	734,678	24,139,974	
British Columbia.....	246	267	85,600,408	11,680	17,121,493	9,752,943	2,097,615	28,972,051	
Yukon.....	123	123	11,991,914	482	803,117	42,549	39,975	885,641	
Canada.....	1,944	6,654	493,694,823	62,249	75,026,501	50,599,698	11,096,564	136,722,763	

DISTRIBUTION OF CAPITAL EMPLOYED IN THE MINING INDUSTRY IN CANADA
1922.

BY INDUSTRIES



BY PROVINCES

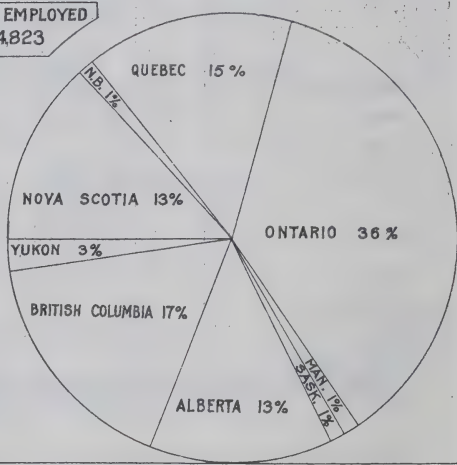


Table 211.—Fuel Used in the Mineral Industry in Canada, by Provinces, 1922

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia and Yukon	Total for Canada
Anthracite Coal...Tons	10	271	4,376	16,154	216	.....	15,520	182	36,729
Value \$	200	2,847	38,506	134,075	1,335	.....	42,059	1,722	220,744
Bituminous Coal...Tons	522,790	12,235	197,074	421,346	30,888	1,210	127,466	292,402	1,605,411
Value \$	1,836,648	67,760	1,348,406	3,370,170	260,038	12,644	567,169	1,323,855	8,786,690
Lignite Coal...Tons	.....	.....	.....	264	115	20,954	169,059	.....	190,392
Value \$	.....	.....	.....	1,468	1,097	23,977	102,662	.....	129,204
Coke.....Tons	.....	.....	2,547	5,033	119	.....	.....	27,396	35,095
Value \$	.....	.....	27,393	70,730	1,719	.....	.....	393,970	493,812
Gasoline.....Imp. gal.	2,939	3,610	21,052	55,990	9	.....	2,073	31,172	116,845
Value \$	1,184	1,477	12,027	19,578	4	.....	829	19,686	54,785
Fuel oil.....Imp. gal.	6,917	7,060	13,099	395,788	526	5,360	3,333	3,219,847	3,651,930
Value \$	1,614	567	3,377	60,020	129	1,149	1,000	212,103	279,959
Wood.....Cord	3,360	9,504	21,411	106,886	15,407	55	2,230	21,521	180,374
Value \$	12,160	49,562	112,833	576,888	83,658	400	8,718	119,754	963,973
Artificial and natural gas.....M Cu. ft	.....	3,835	4,062	311,594	.....	.....	474,123	103,128	896,742
Value \$	.....	1,535	2,547	41,801	.....	.....	12,241	30,938	89,062
Other fuels.....Value \$	350	4,750	.....	37,673	.....	.....	.....	35,562	78,335
Total...Value \$	1,852,156	128,498	1,545,089	4,312,403	347,950	38,170	734,678	2,137,590	11,096,564

Table 212.—Fuel Used in the Mineral Industry in Canada, by Kinds and by Industries, 1922

Industry	Anthra- cite	Bitum- inous	Lignite	Coke	Gasoline and Fuel Oil	Gas	Wood	Other Fuel	Total Value
	Tons	Tons	Tons	Tons	Gal.	M cu.ft.	Cords	\$	\$
<i>Metallic Mineral Industries—</i>									
Auriferous Quartz Mining and Milling—									
Quantity	148	17,984	.....	233	253,615	.....	22,278	.....	.....
Value \$	2,466	206,649	.....	4,744	52,523	.....	84,510	2,571	353,453
Copper-Gold-Silver Mining—									
Quantity	.....	5,451	.....	21	19,260	.....	652	.....	.....
Value \$	.....	66,625	.....	336	2,912	.....	1,960	5,398	77,231
Nickel-Copper Mining—									
Quantity	.....	460	.....	.....	.....	.....	.....	.....	.....
Value \$	.....	5,828	.....	.....	.....	.....	.....	.....	5,828
Silver-Cobalt Mining and Milling—									
Quantity	119	2,704	.....	.....	9,500	.....	3,818	.....	.....
Value \$	2,134	34,705	.....	.....	1,183	.....	22,731	37,489	98,242
Silver-Lead-Zinc Mining and Milling—									
Quantity	182	4,340	.....	31	25,694	.....	2,026	.....	.....
Value \$	1,722	33,850	.....	399	16,018	.....	31,541	.....	89,530
Metallurgical Works—									
Quantity	.....	38,349	.....	31,421	3,125,738	103,128	288	.....	.....
Value \$	.....	330,440	.....	448,552	192,744	30,938	1,770	27,128	1,031,572
Total...Quantity	449	69,288	.....	31,706	3,433,807	103,128	29,062	.....	.....
Value \$	6,312	678,097	.....	451,631	265,350	30,938	142,512	72,586	1,649,856

Table 212.—Fuel Used in the Mineral Industry in Canada, by Kinds and by Industries, 1922—Concluded

Industry	Anthracite	Bituminous	Lignite	Coke	Gasoline and Fuel Oil	Gas	Wood	Other Fuel	Total Value
	Tons	Tons	Tons	Tons	Gals.	M Cu. ft.	Cords	\$	\$
<i>Non-Metallic Mineral Industries—</i>									
Asbestos—									
Quantity	3,487	30,185		2,132	1,111				
Value \$	31,931	211,132		22,455	444				265,962
Coal Mining—									
Quantity	15,520	832,295	184,801						
Value \$	42,059	3,034,491	107,092						3,183,642
Feldspar—									
Quantity		225			419		645		
Value \$		2,171			110		2,950		5,231
Fluorspar—									
Quantity		369			41,670		68		
Value \$		4,416			5,418		250		10,084
Grindstones—									
Quantity		199			7,060		300		
Value \$		1,784			567		1,000		3,351
Gypsum—									
Quantity		13,287		212	867	3,835	1,335		
Value \$		117,199		3,114	338	1,535	5,060		127,246
Iron Oxides—									
Quantity		637			1,020		1,865		
Value \$		6,443			521		9,354		16,318
Magnesite—									
Quantity		543			40		600		
Value \$		6,268			13		878		7,159
Mica—									
Quantity	2	100					184		
Value \$	41	995					771		1,807
Quartz—									
Quantity		2,249			3,000		550		
Value \$		23,771			940		3,250		27,961
Salt—									
Quantity		54,248			5,080		566		
Value \$		365,002			1,183		2,815		369,000
Talc—									
Quantity		280			500				
Value \$		2,608			200				2,808
Miscellaneous Non-Metallic Mineral Industries—									
Quantity	4	102			413		1,779		
Value \$	76	1,792			146		6,201		8,215
Total . . . Quantity	19,013	934,719	184,801	2,344	61,180	3,835	7,892		
Value \$	74,107	3,778,072	107,092	25,569	9,880	1,535	32,529		4,028,784
<i>Structural Materials and Clay Products Industries—</i>									
Cement—									
Quantity	12	379,265			9,844		501		
Value \$	186	2,450,630			3,317		3,323		2,457,456
Clay Products—									
Quantity	13,202	165,478	4,710	946	67,352	512,631	61,335		
Value \$	115,638	1,392,286	17,070	12,538	22,648	32,854	375,409	649	1,969,092
Lime Burning—									
Quantity	2,928	35,028	115		6,739	274,948	78,459		
Value \$	15,136	281,314	1,097		2,458	23,515	396,898	4,750	725,168
Sand and Gravel—									
Quantity	4	7,955	761	99	27,715		211		
Value \$	51	82,202	3,900	1,674	9,631		1,611		99,069
Stone Quarrying—									
Quantity	1,121	13,678	5		162,138	2,200	2,914		
Value \$	9,314	124,089	45		21,430	220	11,691	350	167,139
Total . . . Quantity	17,267	601,404	5,591	1,045	273,788	789,779	143,420		
Value \$	140,325	4,330,521	22,112	14,212	59,484	56,589	788,932	5,749	5,417,924
Grand Total—									
Quantity	36,729	1,605,411	190,392	35,095	3,768,775	896,742	180,374		
Value \$	220,744	8,786,690	129,204	493,812	334,744	89,062	963,973	78,335	11,096,564

Table 213.—Mine Production in Canada 1921 and 1922

	1921			1922		
	Ores or minerals mined	Metals, ores concentrates or minerals shipped	Net value of shipments	Ores or minerals mined	Metals, ores concentrates or minerals shipped	Net value of shipments
	Tons.	Tons	\$	Tons	Tons	\$
<i>Metalliferous ores—</i>						
Iron ores.....	43,208	59,509	230,164	1,255	17,971	56,993
Gold ores—						
Bullion shipped.....		31	14,774,037		43.8	21,246,998
Concentrates and residues.....	1,880,356	16,311	1,915,747	2,431,340	78,660	4,434,373
Silver-cobalt ores—						
Mine bullion shipped.....		173.5	6,316,812		259.2	8,222,303
Ore and concentrates.....	398,931	40,611		426,445	34,719	
Nickel-copper ores.....	262,593	262,593	1,575,558	259,569	259,569	1,557,414
Copper-gold-silver ores.....	1,197,624	1,042,135	2,589,314	1,004,097	911,587	2,031,671
Silver-lead-zinc ores—						
Lead ore and concentrates.....		15,352	678,337		27,203	1,803,575
Zinc ore and concentrates.....	390,073	297,406	1,498,716	505,773	356,194	2,370,237
Placer mining—						
Yukon.....		3	1,300,877		2.3	1,095,547
British Columbia.....		0.5	233,200		0.6	364,800
Total Metalliferous.....	4,172,785	1,734,125	31,112,762	4,628,479	1,686,209	43,183,911
Total Non-Metalliferous.....			87,842,682			82,976,794
Total Structural Materials.....			34,737,428			39,534,741
Total.....			153,692,872			165,695,446

Table 214.—Contents of Shipments, 1921 and 1922

	Gold	Silver	Nickel	Copper	Lead	Zinc
1921	Ozs.	Ozs.	Tons	Tons	Tons	Tons
Milling gold ores—						
Bullion.....	711,121	120,751				
Concentrates.....	52,671	1,594,992		2.5		
Silver-cobalt ores—						
Mine bullion shipped.....		5,060,454				
Ore and concentrates.....		3,294,581				
Nickel-copper ores.....			6,995.8	4,745.6		
Copper-gold-silver ores.....	88,982	418,390		17,701.9		
Silver-lead-zinc ores—						
Lead ore and concentrates.....	1,468	1,000,587			4,760	147
Zinc ore and concentrates.....	8	856,842			29,248	49,399
Placer mining—						
Yukon.....	65,916	14,831				
British Columbia.....	11,281					
Total.....	931,447	12,361,428	6,995.8	22,450.0	34,008	49,546
1922						
Milling gold ores—						
Bullion.....	1,017,421	164,864				
Concentrates.....	134,316	4,489,723		1.5		
Silver-cobalt ores—						
Mine bullion shipped.....		7,526,646				
Ore and concentrates.....		4,530,808				
Nickel-copper ores.....			8,677.5	5,420.8		
Copper-gold-silver ores.....	48,453	469,723		16,262.4		
Silver-lead-zinc ores—						
Lead ore and concentrates.....	304	2,163,637			10,668	755
Zinc ore and concentrates.....	50	1,519,011			39,177	51,488
Placer mining—						
Yukon.....	54,370					
British Columbia.....	17,647					
Total.....	1,272,561	20,864,412	8,677.5	21,684.7	49,845	52,243

UNITED STATES TARIFF RATES ON MINERAL PRODUCTS IMPORTED

Since Canadian producers of mineral products market a large part of their annual output in the United States it was thought it might be of value to readers of this report to have at hand a guide to United States Tariff and the following tables were therefore compiled.

United States Tariff

Item Number	Material	Duty
(a) On Metals, and Manufactures of.		
1508	Antimony ore.....	Free
1550	Cobalt metal and ore.....	Free
29	Cobalt, oxide, sulphate and all other Cobalt salts.....	30% ad val.
1556	Copper ore, regulus of, and black or coarse copper, and cement copper, old copper, fit only for manufacture, copper scale, clippings from new copper, and copper in plates, bars, ingots, or pigs not manufactured or specially provided for.....	Free.
1557	Copper sulphate or blue vitriol, copper acetate and subacetate.....	Free.
381	Copper in rolls, rods or sheets.....	2½ c. per lb.
	Engravers plates, not ground and seamless copper tubes and tubing.....	7c. per lb.
	Engravers plates ground and brazed copper tubes.....	11c. per lb.
	Brass rods, sheet brass, brass plates, bars, and strips, muntz metal sheathing bolts, piston rods and shafting.....	4c. per lb.
	Seamless brass tubes.....	8c. per lb.
	Brazed brass tubes, angles and channels.....	12c. per lb.
	Bronze rods and sheets.....	4c. per lb.
	Bronze tubes.....	8c. per lb.
1539	Bullion gold or silver.....	Free.
1634	Gold ores and sweepings.....	Free.
1597	Iron ore including manganiferous iron ore and residuum from burnt pyrites.....	Free.
1677	Sulphur in any form, and sulphur ore, and spent oxide of iron containing more than 25 per centum of sulphur.....	Free
392	Lead bearing ores and mattes—duty applied on lead contents, such duty shall not be applied to the lead contained in copper mattes unless actually recovered.....	1½c. per lb.
393	Lead bullion or base bullion, lead in pigs and bars, dross, reclaimed lead, scrap lead, antimonial lead, antimonial scrap lead, type metal, babbitt, solder and all other combinations not specially provided for, duty to apply on lead contents.....	2½c. per lb.
	Lead in sheets, pipe, shot, glaziers lead and lead wire.....	2½c. per lb.
302	Manganese ore or concentrates containing in excess of 30 per centum of metallic manganese.....	1c. per lb. on metallic manganese content.
302	Molybdenum ore or concentrates.....	35c. per lb. on metallic molybdenum content.
302	Tungsten ore or concentrates.....	45c. per lb. on metallic tungsten content.
1634	Nickel mattes and ores of nickel.....	Free.
390	Nickel oxide.....	1c. per lb.
390	Nickel and nickel alloys in pigs, ingots shot, tubes and similar forms.....	3c. per lb.
390	Nickel in bars, rods, sheets, strips, tubing, etc.....	25% ad val.
390	In addition thereto on the foregoing if cold rolled, drawn or worked.....	10% ad val.
1596	Platinum, palladium and other metals of the platinum group.....	Free
394	Zinc-bearing ore of all kinds containing less than 10 per centum of zinc.....	Free.
	Containing more than 10 per centum of zinc and less than 20 per centum.....	¾c. per lb. on metallic zinc contents.
	Containing more than 20 per centum of zinc and less than 25 per centum.....	1c. per lb. on metallic zinc contents.
	Containing 25 per centum of zinc or over.....	1½ c. per lb. on metallic zinc contents.
395	Zinc in blocks pigs or slabs and zinc dust.....	1½c. per lb.
395	Zinc in sheets.....	2c. per lb.
395	Zinc scrap for re-manufacturing.....	1½c. per lb.
(b) On Non-Metallic Minerals		
1619	Actinolite—crude, apparently classified as “minerals, crude, not specially provided for”....	Free
214	Actinolite—ground, apparently classified as “earthy or mineral substances, wholly or partly manufactured, not specially provided for”.....	30% ad val.
1513	Arsenic—white or arsenious acid.....	Free
1512	Arsenic—Sulphide of.....	Free.
379	Arsenic—Metallic.....	6c. per lb.
1515	Asbestos—crudes, fibres, sand.....	Free.
1401	Asbestos—yarn.....	30% ad val.
69	Barytes—ore, crude.....	\$4 per ton
69	Barytes—ore, ground.....	\$7.50 per ton.
	Calcite—not mentioned by this name in the tariff. Chalk, crude, is free (Item 1545) and chalk, ground, is dutiable at 25% ad valorem (Item 20).	
1547	Chromite—chromite or chrome ore.....	Free
1570	Corundum—ore.....	Free
1415	Corundum—ground.....	1c. per lb.
1619	Feldspar—crude, apparently classified as “minerals, crude not specially provided for”....	Free
214	Feldspar—ground, apparently dutiable as “earthy or mineral substances, wholly or partly manufactured, not specially provided for”.....	30% ad val.

United States Tariff—Concluded

Item Number	Material	Duty
207	Fluorspar.....	\$5.60 per ton
213	Graphite or plumbago—crude or refined—Amorphous.....	10% ad val.
213	Graphite or plumbago—crude or refined—Crystalline lump, chip or dust.....	20% ad val.
213	Graphite or plumbago—crude or refined—crystalline flake.....	1½c. per lb.
236	Grindstones—finished or unfinished.....	\$1.75 per ton
1643	Gypsum—crude.....	Free
205	Gypsum—ground.....	\$1.40 per ton
75	Iron oxides—ochres, crude.....	½c. per lb.
75	Iron oxides—ochres, washed or ground.....	½c. per lb.
75	Iron oxides—"iron-oxide pigments not specially provided for".....	20% ad val.
204	Magnesite—crude.....	5/16c. per lb.
204	Magnesite—caustic calcined.....	½c. per lb.
204	Magnesite—dead burned and grain.....	23/40c. per lb.
50	Magnesium sulphate—(Epsom salts).....	½c. per lb.
302	Manganese—ore or concentrates, containing in excess of 30 per centum of metallic manganese.....	1c. per 1 lb. on metallic Mn content.
208	Mica—unmanufactured, valued at not above 15 cents per pound.....	4c. per lb.
208	Mica—unmanufactured, valued above 15 cents per pound.....	25 ad val.
208	Mica—cut or trimmed, and mica splittings.....	30% ad val.
208	Mica—ground.....	20% ad val.
808	Mineral waters.....	10c. per gal.
140	Phosphate—"phosphates, crude".....	Free
1677	Pyrites—"sulphur ore, such as pyrites or sulphuret of iron in its natural state, and spent oxide of iron, containing more than 25% of sulphur".....	Free
83	Salt—in bags, sacks, barrels, or other packages.....	11c. per cwt.
83	Salt—in bulk.....	7c. per cwt.
83	Sodium sulphate—crystallized or Glauber salt.....	\$1.00 per ton
1667	Sodium—sulphate, crude or salt cake.....	Free
207	Silica—crude, not specially provided for.....	\$4 per ton
207	Silica—for use as pigment, not specially provided for.....	\$7.50 per ton
209	Talc—crude.....	½c. per lb.
209	Talc—ground, washed, powdered, or pulverized (except toilet preparations).....	25% ad. val.
1675	Tripoli—crude or manufactured, not specially provided for.....	Free
(c) On Structural Materials and Clay Products		
Clay Products—		
201	Brick—bath, chrome and fire, n.s.p.f.....	25% ad val.
1536	Brick—not specially provided for.....	Free
207	China clay or Kaolin.....	\$2.50 per ton
207	Clays or earths, unwrought or unmanufactured, including common blue clay and Gross-Almerode glass pot clay, n.s.p.f.....	\$1.00 per ton
207	Clays or earths, wrought or manufactured, n.s.p.f.....	\$2.00 per ton
210	Earthenware—common yellow, brown or gray made of natural, unwashed, and unmixed clay, plain or embossed; common salt-glazed stoneware; stoneware and earthenware crucibles; all the foregoing not ornamented, incised, or decorated in any manner.....	15% ad val.
210	Earthenware—ornamented, incised, or decorated in any manner and manufactures wholly or in chief value of such ware, n.s.p.f.....	20% ad val.
207	Earthenware—Rockingham.....	25% ad val.
203	Lime—not specially provided for.....	10c. per cwt.
203	Lime—hydrated.....	12c. per cwt.
237	Slates—slate chimney pieces, mantles, slabs for tables, roofing slates, and all other manufactures of slate, n.s.p.f.....	15% ad val.
Stone—		
203	Limestone—(not suitable for use as monumental or building stone) crude, or crushed but not pulverized.....	5c. per cwt.
235	Limestone, freestone, granite sandstone, lava and all other stone suitable for use as monumental or building stone, except marble, breccia, and onyx, n.s.p.f., hewn, dressed, or polished, or otherwise manufactured.....	50% ad val.
235	Unmanufactured, or not dressed, hewn, or polished.....	15c. per cubic ft.
232	Marble, breccia and onyx, in block, rough or squared only.....	65c. per cubic ft.
232	Marble, breccia and onyx, sawed or dressed, over two inches in thickness.....	\$1.00 per cubic ft.
232	Marble, breccia and onyx slabs and paving tiles, containing not less than four superficial inches, if not more than one inch in thickness.....	8c. per superficial foot
	If more than one inch and not more than one and one-half inches in thickness.....	10c. per superficial foot.
	If more than one and one-half inches and not more than two inches in thickness.....	13c. per superficial foot.
	If rubbed in whole or in part.....	3c. per superficial foot in addition.
	Mosaic cubes of marble, breccia, or onyx, not exceeding two cubic inches in size, if loose.....	One-fourth of one cent per lb. and 20% ad val.
	If attached to paper or other material.....	5c. per superficial foot and 35% ad val.
1675	Stone and sand: Burrstone in blocks, rough or unmanufactured; quartzite; traprock; rottenstone; tripoli and sand, crude or unmanufactured; cliff stone; freestone; granite and sandstone; unmanufactured and not suitable for use as monumental or building stone; all of foregoing not specially provided for.....	Free

REVIEW OF METALLURGICAL PRACTICE IN CANADA

BY DION S. HALFORD, B.A.Sc.

Introduction

Metallurgical practice as employed in Canadian mills, smelters and refineries for the recovery of the non-ferrous metals from their ores has been described by many writers in trade journals such as the *Engineering and Mining Journal-Press* and the *Canadian Mining Journal* and in papers presented at meetings of the Canadian Institute of Mining and Metallurgy, the American Institute of Mining Engineers and other scientific societies as well as in various Government reports, both Provincial and Dominion, but up to the present no general review embodying the principal features of the typical processes employed in each of the main divisions of the industry has been compiled for the convenient reference of the reader who desires to obtain a general conspectus of the industry.

In the following review the plan adopted has been to consider the principal metals separately and to describe the processes used in the principal plants in which the said metal is recovered. The description includes processes for the recovery of gold, silver, cobalt, nickel, copper, lead and zinc in the order named.

Gold, because of its importance in Ontario and in British Columbia, has been treated more extensively than the other metals and the review includes descriptive notes on the processes used in the following Ontario mines: Hollinger, Dome, McIntyre-Porcupine, Wright-Hargreaves, Kirkland Lake, Teck-Hughes, Lake Shore, Tough-Oakes, Montreal-Ontario-Kirkland; and in British Columbia, the Hedley, Premier, Nugget, and Belmont Surf Inlet.

Silver recovery has been described by reference to the processes used in the Nipissing, Cobalt Reduction Company and Coniagas mills.

Cobalt and its compounds are recovered by two smelters in south Ontario; the plants of the Coniagas Reduction Company at Thorold and the Deloro Smelting and Refining Company at Deloro, Ontario, have been described.

Nickel recovery operations in the plants of the International Nickel Company of Canada, Ltd., the Mond Nickel Company and the British America Nickel Corporation have been described.

Copper smelting and refining processes reviewed include those used by the Consolidated Mining and Smelting Company at Trail, the Granby Consolidated Mining, Smelting and Power Co., Ltd., at Anyox, B.C., and the Britannia Mining and Smelting Company, Ltd., Britannia, B.C.

Lead smelting as practised by the Consolidated Mining and Smelting Company at Trail has been described and notes have been included on the Silver Standard, Silversmith, and Alamo plants.

Zinc production, electrolytically, by the Consolidated Mining and Smelting Company at Trail and a description of the new Kimberley mill form the subject matter of the concluding section in this review.

Gold

Gold is found in Canada over widely-distributed areas and with a great variety of mineralogical associations. The associated minerals are the determining factor in the choice of a metallurgical treatment as the gold itself is seldom in chemical combination with any other element. Accordingly, we find in Canada several types of ore from which gold is extracted by different processes and which for convenience are classified under the following divisions:

(1) The placer or alluvial gold deposits of the Yukon and British Columbia where the gold occurs in coarse nuggets in sand and gravels requiring only a comparatively crude gravity concentration or amalgamation with mercury.

(2) The free-milling ores which are amenable to cyanidation and amalgamation. This is the most important type in Canada at present.

(3) Gold ores refractory to cyanide, that is to say, ores in which gold is the essential mineral but which contain some other mineral which prevents the use of the cyanide process.

The gold ores containing copper, the most notable of which are those of the Belmont Surf Inlet Mine at Surf Inlet, B.C., belong to this class. The copper would cause a very heavy consumption of cyanide so the ore is concentrated and the concentrates smelted.

The carbonaceous gold ores found in some of the veins in the Porcupine camp also belong to this class. The carbonaceous matter causes precipitation of the dissolved gold from solution due, it is thought, to occluded gases. A large amount of research work has been done on the treatment of these ores by the metallurgists of the McIntyre and Hollinger mines. A novel method of treatment has been worked out by Mr. André Dorfman of the McIntyre involving the agitation of the ore with oil which coats the carbon particles thereby rendering them inert. The Hollinger staff has done a large amount of laboratory work along similar lines but as yet we have no record of the use of this system in actual milling practice. The extent of this class of ore is small when compared with the free milling type.

(4) Gold associated with arsenic is found at many points particularly Mt. Uniacke, N.S., Deloro, Temagami, Howry Creek and Long Lake in Ontario, and at Hedley, B.C. At the latter point the Nickel-Plate mine, in 1922 as in former years, milled an arsenopyrite ore recovering gold in the form of bullion by the cyanide process and an arsenical concentrate which was shipped to United States smelters; payment was made for both gold and arsenic contents.

(5) In addition to the above, gold is recovered in large amounts from ores which are treated essentially from some other minerals. The chief source of such gold is in the smelting of copper ores of British Columbia and the nickel-copper ores of Ontario.

The greater portion of the gold produced in Canada in 1922 was recovered by the cyanide process. This process as practised in the mills of Northern Ontario varies from one plant to another in mechanical detail but in every case five essential steps are taken as follows:—

- (1) Reducing the ore to a size small enough to free the gold particles;
- (2) Dissolving the gold in a weak solution of sodium cyanide in water;
- (3) Removing the solution containing the dissolved gold from the impoverished ore;
- (4) Precipitating the gold from the pregnant solution by zinc;
- (5) Refining the precipitates.

The mill of the *Hollinger Consolidated Gold Mines, Ltd.*, at Timmins, Ontario, has a capacity of 4,500 tons of ore per day and is the largest in Canada. The cyanide process is used. During the year 1922 the ore reduction capacity was increased by the addition of rolls and the extraction losses reduced by the installation of Oliver filters. A competitive test was carried on between a rod mill and two ball mills. Results of this test were not made public, but it is significant that orders have been placed for rod mills to replace the stamps.

Reduction of the ore is accomplished by gyratory crushers followed by rolls until the size is one inch. The next step is primary grinding by means of stamps, ball mill or rod mill at present. From this step the ore passes to Dorr classifiers, which are in closed circuit with tube mills. In the tube mills Danish flint pebbles are used as the grinding medium.

The pulp overflowing the Dorr classifier passes to thickeners, from which the clear solution overflowing is ready for precipitation. The thickened pulp underflow is agitated in Dorr agitators and then concentrated on Deister tables. There are 25 double-deck and 88 single-deck tables. Table concentrates are reground and agitated in solution which contains more sodium cyanide than the ordinary mill solution.

This is practically the last operation in which extraction of the gold from the ore takes place. From this point the table tails and treated concentrates are sent to the decantation plant and from there to the Oliver filters. Both of these operations are for the purpose of removing solution containing dissolved gold from the impoverished ore. The decantation plant contains 8 rows of thickeners with 4 thickeners per row. The thickeners are of the tray type, 40 feet in diameter and 15 feet deep. In the filter plant there are seven 14 x 12 ft. Oliver filters.

HOLLINGER MILLING RESULTS IN 1922

(From the Annual Report of Hollinger Consolidated Gold Mines, Ltd.)

Tons of ore milled.....	1,491,381
Average value per ton.....\$	8.53
Gross value.....\$	12,726,550
Net value recovered.....\$	12,274,115
Average tons per day.....	4,097
Per cent of possible running time.....	90.5
Tons per 100 per cent running time.....	4,527
Stamp duty per 100 per cent running time.....	20.12
Solution precipitated per ton ore.....	1.85 tons
Value per ton in tailings.....\$	0.30
Cyanide consumed per ton of ore.....	0.490 lb.
Zinc dust consumed per ton of ore.....	0.133 "
Zinc dust consumed per ton of solution.....	0.072 "
Lime consumed per ton of ore.....	2.970 "
Lead acetate per ton of ore.....	0.008 "
Average value pregnant solution.....\$	4.43

At the *Dome Mines, Limited*, South Porcupine, the mill was changed around during 1922 to meet new conditions created by a higher grade of ore being milled than formerly. When the low-grade ore was being milled, the sands were separated from the slimes and treated separately. At present it is necessary to grind practically everything to 200-mesh in order to free the gold particles. However, the practice of impoverishing ore by amalgamation before cyaniding has been retained. The capacity of the mill is slightly over 1,000 tons per day.

After preliminary crushing in gyratory and jaw crushers, the ore goes to a trommel with 2-in. openings, from which the oversize goes to the stamp feed bin and the undersize to the ball mill feed bin. There are 60 stamps and three 8 ft. x 30 in. Hardinge ball mills. Both stamps and ball mills discharge into 5 Dorr classifiers. There are 5 tube mills using flint pebbles in closed circuit with these classifiers.

The overflow from the classifiers is pumped to the amalgamation plates. The gold amalgam is retorted. After flowing over the amalgamation plates the ore passes over a set of concentrating blankets. The concentrates from these blankets are treated in an amalgam barrel. After passing over the blankets the ore is classified in 12 Merrill cones, the overflow containing the fines going to the cyanide department, and the underflow to 2 tube mills which discharge on amalgam plates, the whole being in closed circuit with Dorr classifiers. The overflow is returned to the original amalgamation circuit, so that all of the ore must eventually be ground fine enough to overflow in the Merrill cones before cyaniding. This calls for extremely fine grinding.

In the cyanide department the pulp is de-watered in Dorr thickeners and the cyanide solution is added before agitation, which is accomplished in a continuous series of 10 Pachuca agitators followed by two mechanical agitators. The solution is removed from the impoverished ore in Merrill filters. The pregnant solution is clarified in five 40 ft. sand clarifiers and de-aerated by the Crowe vacuum process. Gold is precipitated by zinc dust in Merrill equipment.

The mill of the *McIntyre Porcupine Mines, Ltd.*, with the equipment added in 1922 now has a capacity of 1,000 tons a day. Preliminary crushing to 1 in. is accomplished in one gyratory crusher, followed by rolls. These operations are carried on at the shaft from which the ore is conveyed by an aerial tram to the mill. It is ground to 8-mesh by 3 Hardinge ball mills and then slined in 5 tube mills operated in closed circuit with 5 Dorr Duplex Classifiers. The classifier overflow runs to the primary thickeners, from which the overflow is the pregnant solution. The underflow from the primaries is agitated in three series of Dorr agitators. Solution is removed from the impoverished ore by continuous countercurrent decantation. There are four rows of 30-ft. single thickeners, 4 tanks to a row, and one row of double-tray, 59-ft. tanks in the decantation department.

Gold is precipitated from the pregnant solution by zinc dust in combination with the Crowe vacuum process.

In addition to the mills described above, there are four other fully-equipped cyanide-plants in the Porcupine camp which were not operated in 1922, as well as two small mills equipped for amalgamation. The cyanide mills are on the following properties:

- (1) The Porcupine Crown Gold Mines Limited.
- (2) The Schumacher Gold Mines Limited;
- (3) The Vipond Consolidated Mines Limited.
- (4) The Consolidated West-Dome-Lake Mines Limited.

The amalgamation mills are on the Clifton Porcupine and Three Nations properties.

The mill of the *Wright-Hargreaves Mines, Limited*, at Kirkland Lake operated continuously in 1922. This mill was designed to treat 200 tons per day, and is generally looked upon as an ideal small mill from both mechanical and metallurgical standpoints. Crowding of machinery has been avoided, and altogether the safety and comfort of the operators given more consideration than usual.

Ore from the mine is crushed in two jaw-crushers and run to a 600-ton mill storage bin. Grinding is done in an 8-ft. Hardinge mill followed by two tube mills in closed circuit with two Dorr classifiers. The overflow of the classifiers runs to a Dorr thickener. Underflow from this thickener is agitated in three agitators and solution removed from the impoverished ore by continuous countercurrent decantation, for which a series of five thickeners is used. Water is added as a wash in the fifth tank and barren solution is added in the fourth. Overflow from the first tank is used for crushing solution and that from the thickener following the classifiers is the pregnant solution. The gold is precipitated from this solution by zinc dust used in a combination of the Crowe Vacuum and Merrill processes. The gold precipitates are smelted to crude bullion on the property, and the bullion is shipped to the Royal Mint.

Kirkland Lake Gold Mining Co., Ltd., operated their mill continuously in 1922. This mill has a capacity of 150 tons per day. Ore is ground in an 8 ft. x 30 in. Hardinge mill and 6 x 16 ft. tube mill. Solution is removed from impoverished ore by countercurrent decantation. Gold is precipitated by zinc dust.

Teck-Hughes Gold Mines operated their mill continuously in 1922. The capacity of the mill was 60 tons per day. The high value of ore milled presented new problems, due to the extra length of time necessary for complete impoverishment of the ore by cyanide, which was, of course attended by lowering of the mill capacity. A treatment involving the addition of sodium peroxide before agitation was worked out by the management and proved very successful.

Grinding is done by a 5x5 ft. P. & M. cylindrical ball mill followed by a 5x20 ft. P. & M tube mill. Agitation is done by 3 Dorr agitators and solution is removed by settling in one Dorr thickener and filtering in one 11 ft. 6 in. x 8 ft. Oliver filter. Gold is precipitated from the solution by zinc dust.

The Lake Shore Mines at Kirkland Lake, Ontario, is equipped with a mill, the capacity of which is approximately 60 tons per day. The standard practice of grinding to slime is followed in this mill. Dissolved gold is removed from impoverished ore by continuous countercurrent decantation.

The mill of the *Tough-Oakes* mine was operated intermittently in 1922. It has a capacity of 100 to 125 tons per day. The process is similar to the *Wright-Hargreaves* in essential details.

The *Montreal-Ontario-Kirkland Mine* is also equipped with a mill which was constructed in 1922. It has a capacity of about 100 tons per day, but was only operated for a short period. Standard practice was followed closely.

The Hedley Gold Mining Co., of Hedley, B.C., operates the Nickel Plate mine. The gold is associated with mispickite (arsenopyrite) in the ore. The mill uses a combination of cyanidation and concentration, the arsenic contents of the concentrates being paid for by the smelters as well as the gold. The ore is crushed in cyanide solution by 40 stamps and ground in 5 tube mills, which are in closed circuit with 5 Dorr classifiers. From the classifiers the pulp passes to 3 slime settlers, the overflow from which is the pregnant solution. This is clarified and the gold precipitated. The slimes from the settlers are agitated and then filtered by three 11 ft. 6 in. x 8 ft. Oliver filters. The pulp from the filters is agitated with water and concentrated on 12 Deister tables and 24 Frue vanners. The concentrates are de-watered and shipped to the United States. The mill capacity is in the neighbourhood of 200 tons per day.

The Premier Gold Mine at Premier, near Stewart, B.C., is equipped with a mill which was designed to treat 100 tons per day. On account of the complex nature of the ore a combination of concentration and cyanidation is used. Ore is first ground in a Marcy mill, classified and tailed. Table tails are reground in a ball mill in closed circuit with a Dorr bowl classifier, and then submitted to flotation. Table and flotation concentrates are shipped to smelters. The tailings from the flotation machine are thickened, filtered and then cyanided. Cyanide precipitates are shipped to the smelters for refining.

Nugget Gold Mines, Ltd., Salmo, B.C., operated the Motherlode mill. This mill has a capacity of 100 tons a day and is equipped for all-sliming cyanidation. The ore is crushed to 1½ in. in a Blake crusher, thence by 10 stamps and a tube mill in closed circuit with a Dorr classifier. Agitation is accomplished in 4 Pachucas and solution freed from impoverished ore by a Dorr thickener and Merrill filter presses. Gold is precipitated by zinc dust.

Belmont-Surf-Inlet. The ore from this mine, which is situated at Surf Inlet, B.C., is a pyritized quartz carrying chiefly gold values with a little silver and copper. The metallurgical treatment consists of straight concentration and is interesting from the fact that it is probably the only place in Canada where an ore mined essentially for gold is concentrated without previous impoverishment of gold values by amalgamation or cyanidation. The mill has a capacity of 300 tons per day. The ore is crushed in a gyratory crusher to 2 in. and then to 320-mesh by two 6 x 5 ft. ball mills. This product is tailed on 6 double-deck Wilfley tables. Table tails are de-watered and reground in four 5 x 16 ft. tube mills, which are run in closed circuit with Dorr classifiers. Flotation is the next step. This is accomplished by machines of the Jones-Belmont type. The oil mixture is 5 per cent pine oil, 35 per cent creosote and 60 per cent coal tar. Small amounts of sodium sulphide are also used. Flotation concentrates are de-watered by means of a Dorr thickener and an Oliver filter.

Silver

The mill of *The Nipissing Mining Co., Limited*, at Cobalt has a capacity of 250 tons per day. There are two departments, known locally as the low-grade mill and the high-grade mill. In the low-grade mill the ore is first concentrated and the tailings from this concentration cyanided. The concentrates are sent to the high-grade mill and cyanided by themselves, as they require a different treatment from the tailings.

The treatment in the low-grade mill may be summarized as follows:—

1. Crushing run-of-mine ore to 4 in. at the mine in 18 x 36 in. jaw crushers.
2. Crushing to 1½ in. at the mill in gyratory crushers.
3. Stamping to 4-mesh by 40 stamps.
4. Roughing on Wilfley sand tables.
5. Fine grinding in tube-mills to 8 per cent plus 200-mesh.
6. Roughing fines on Wilfley slime tables.
7. Final sliming in tube-mills with 1½-in. iron balls.
8. Agitation for 50 hours in sodium cyanide solution.
(strength 0.25 per cent KCN) in mechanical agitators.
9. Filtering in Butters filters.
10. Sodium sulphide precipitation.
11. De-sulphurizing precipitate of silver sulphide.
12. Melting and refining bullion.

In the high-grade mill the table concentrates and high-grade ore are charged to a tube mill and ground for 23 hours. The next step is a wash with 3 per cent sulphuric acid to remove cyanicides such as decomposed nickel compounds. The acid is washed off by diluting it with water, settling and decanting. The pulp from the acid treatment is pumped to the cyanide vats, where it is agitated with 0.5 per cent solution at a dilution of 35 parts of solution to 1 part of ore. After filtering, the silver is precipitated from the solution with sodium sulphide.

The following data on milling results at the *Nipissing* are taken from the 1922 annual report to shareholders:

"Based on tonnage treated of 82,025 tons the cost per ton attributed to the high-grade mill was \$1.662, and to the low-grade mill \$4.189.

LOW-GRADE MILL COSTS

	Cost per ton
Mine Crushing plant.....	\$ 0-009
Aerial tram.....	0-064
Surface tram.....	0-109
Crushing and elevating.....	0-122
Batteries.....	0-284
Tube mills.....	0-726
Concentration.....	0-279
Cyanide treatment.....	1-641
Filtering.....	0-234
Precipitation.....	0-192
Refining.....	0-070
Heating.....	0-264
Water service.....	0-054
Residue dam.....	0-018
Research.....	0-040
Total.....	\$ 4-189

ANALYSING THE COSTS IN ANOTHER WAY

	Cost per ton
Labour.....	\$ 1-051
Supplies.....	2-252
Power.....	0-670
Shops.....	0-238
Total.....	4-211
Less credits.....	0-022
Total.....	\$ 4-189

COST OF CHEMICALS AND MAIN SUPPLIES AT LOW-GRADE MILL

	Total pounds	Cost per pound	Pounds per ton	Cost per ton
Sodium cyanide.....	527,523	0-1779	6-430	\$ 1-1443
Soda ash.....	525,200	0-0259	6-403	0-1659
Lime.....	462,300	0-0081	5-636	0-0462
Pebbles.....	229,200	0-0153	2-794	0-0429
Sodium sulphide.....	70,338	0-0464	0-858	0-0398
Caustic soda.....	34,560	0-0474	0-421	0-0201
Iron balls (14).....	3,257	0-0399	0-039	0-0542
Aluminium.....	3,250	0-2281	0-039	0-0091
Hydrochloric acid.....	5,452	0-0805	0-066	0-0053
Steam coal.....	2,453,000	0-0055	29-905	0-1635
				\$ 1-6913

The ores from the mines of the *Mining Corporation of Canada* as well as customs ores from other mines, are treated by the *Cobalt Reduction Company*, a subsidiary company. The mill of this company is capable of treating about 300 tons per day. The ore is crushed in stamps, concentrated on tables, reground in tube mills and classified into sands and slimes. The sands are again tabled and the table tailings run to waste. The slimes are cyanided.

Table concentrates are ground to minus 200-mesh and treated with calcium hypochlorite which acts on the chief cyanicides, changing them to chlorides. These chlorides are then dissolved out by washing thoroughly with water and filtering on an Oliver filter. The pulp is then agitated with cyanide solution at a high dilution. The silver is precipitated out by sodium sulphide. When cyanidation is complete the pulp residue is sold to smelters for the cobalt content.

The mill of the *Coniagas Mines, Limited*, at Cobalt has a capacity of 300 tons per day. Concentration by gravity and flotation is employed, the concentrates being shipped elsewhere for further reduction.

After preliminary breaking in a jaw crusher and gyratory crusher, the ore is crushed by 60 stamps and tabled on Deister sand tables. The table tailings are classified in a drag classifier, from which the slime overflow goes to a thickener and the sand to three tube mills in which 4-in. iron balls are used as the grinding medium. Everything is ground to pass 80-mesh, and after classifying is passed over slime tables. The tailings from the slime tables are pumped to the flotation plant. The flotation unit consists of 4 treble-length Callow cells for roughing, 3 single-cell cleaners, and one recleaner. The oil mixture used is composed of coal-tar creosote,

pine oil and coal tar. Sulphur dissolved in the creosote is found to be beneficial from the standpoint of extraction, while sodium silicate used in the final cleaning raises the grade of concentrates.

Cobalt

Practically the whole of the world's supply of cobalt is produced from Ontario ores which are mined primarily for their silver contents. There are three smelters in Ontario in which the cobalt contents of these ores can be extracted. The complex nature of the ore with silver, arsenic, iron, copper, nickel and many gangue minerals being present, as well as the cobalt, makes the extraction of the latter both difficult and expensive.

Cobalt is used chiefly in the manufacture of stellite, an alloy for high-speed cutting tools, and as one of the main constituents of permanent magnets; it is also used as a catalytic agent in the hydrogenation of oils. The oxide is used mainly for colouring in the ceramic and enamel industries while the salts are used as driers in paints and varnishes.

In contrast to the metallurgy of other metals, very little seems to be known about the metallurgy of cobalt except by those engaged in the industry. Smelters for treating cobalt ores are situated at Deloro, Thorold and Welland, while others since dismantled were erected at Copper Cliff, Trout Lake, Orillia and Welland.

The smelter of the *Coniagas Reduction Company* at Thorold, Ontario, was erected in 1907. It produces refined silver, cobalt oxide and metal, nickel oxide and metal, white arsenic, and metallic arsenic. In the process used the ore is crushed, ground in a Krupp mill and sampled by a Venzin automatic sampler, two separate samples being taken. The ground ore is smelted in a blast furnace with limestone and iron ore, the products being impure metallic silver, an argentiferous speiss containing cobalt, nickel and iron, and also flue-dust and slag. The impure silver is cast into anodes and refined electrolytically. The speiss is treated with chemicals to recover cobalt, silver and nickel. Various grades of cobalt oxide containing from 60 to 76 per cent metallic cobalt are made depending on the demand of the market. A pure variety of arsenious oxide is produced by refining the arsenical fume from the dust flues and collectors.

The plant of the *Deloro Smelting and Refining Company* at Deloro is equipped to produce refined silver, cobalt oxide and metal, nickel oxide and metal and white arsenic. Plants connected with the smelter are equipped for producing stellite and insecticides. The ore is crushed to 15-mesh in a ball mill and sampled with a Snyder sampler. It is then mixed with the necessary fluxes and smelted in a blast furnace, the products being metallic silver, an argentiferous speiss, slag and flue-dust. The argentiferous speiss is recrushed, roasted in an oil-fired Bruckner furnace to get rid of arsenic and then given a chloridizing roast with salt.

The chloridized speiss is charged into agitating tanks where the silver is extracted by sodium cyanide. Residues from this treatment are dissolved in acid, but the similarity of the properties of iron, nickel and cobalt still remain. They are precipitated by alkaline hydrates or carbonates under special conditions. Cobalt is separated from nickel by precipitating it as cobaltic hydrate by hypochlorite solution. To insure purity the oxide is dissolved and again precipitated. In this operation chlorine gas is evolved and the handling of it is very troublesome.

The corrosive effect of solutions used in operations of so complex a nature is very great and the handling of them presents a problem at all times difficult to solve. The magnitude of the problem may be seen at once from the fact that in the production of one pound of cobalt it is necessary to handle 3,000 pounds of solution.

Nickel

The nickel-copper industry in Canada is centered around Sudbury, Ontario. The main ore deposits are classified as marginal and occur at the edge of a batholith whose axes on surface are approximately 35 and 15 miles. The ore is found along the contact of norite and granite gneiss. The copper is present in the ore as chalcopyrite and the nickel as pentlandite, both of which are very finely disseminated throughout pyrrhotite. As a rule, the pyrrhotite grades off into norite so that there are larger amounts of rock which might be worked profitably when metal prices are sufficiently high or if cheaper metallurgical processes could be found.

However, at the present time the known ore bodies are of tremendous size, the probable ore amounting to over 100,000,000 tons, and the problem since the war has been to find an outlet for nickel in commerce. The nickel companies have had large research staffs employed on the work of finding new uses for nickel and the results of this work have been very satisfactory. There is a growing demand for non-corrosive metals that can be rolled, and easily worked in machine shops. Monel metal produced by the International Nickel Company and "Corronil" the new alloy in the production of which the Mond company is interested, fill this demand.

The use of nickel for cooking utensils is on the increase particularly in England and will undoubtedly spread. The advantages claimed for solid nickel cooking utensils are that they are superior from a hygienic standpoint, wear better than others, and require practically no repairs. In the motor car industry, the use of nickel for trimmings and fittings is on the increase. Nickel coinage is becoming more popular and each year finds different countries increasing the amounts in circulation. Large amounts of nickel are consumed in the manufacture of resistance wires for electric heaters, grates, etc. The nickel-plating and nickel-steel industries have been well established for years.

During 1922 the International Nickel Company closed and dismantled their old refinery at Bayonne, N.J., and will in future produce all their refined nickel, nickel salts, etc., at Port Colborne, Ontario. However, they are increasing the output of their Monel plant at Huntington, West Virginia, and will continue to export matte to this point. The Mond Nickel Company is financially interested in the Henry Wiggin and Company, Limited, Birmingham, England, and the American Nickel Corporation with a plant at Clearfield, Pennsylvania. These plants turn out nickel rods, sheets, wires and also their new alloy, Corronil.

There are three companies engaged in the nickel-copper smelting industry in Canada, the third company being the British America Nickel Corporation. All three companies carry on operations in the Sudbury district up to the point where the metals are extracted from the ores in the form of matte. This matte which contains compounds of nickel and copper with sulphur as well as some iron and precious metals is shipped to refineries. While the refining operations of the three companies are based on widely differing principles, the metallurgy involved in the the production of matte is quite similar to standard metallurgical processes used in the treatment of pyritic copper ores. Preliminary treatment at each plant differs owing to the characteristics of the ores treated.

The International Nickel Company's ore from their most important mine, *Creighton*, is a heavy sulphide. It is crushed, hand-sorted and screened at the mine. The coarse ore is roasted in heaps in the open. Wood of cord-wood length is piled on end and the ore heaps built on top. The complete roasting of a heap takes several months. The reason for this roasting is to burn off sulphur so as to obtain higher grade matte in the blast furnaces and to oxidize the iron so that it will slag off. The roasted ore is loaded by steam shovels into standard railway cars and brought to Copper Cliff where it is bedded with green ore of a suitable fluxing nature and coke. From here it is charged to the blast furnaces of which there are eight. The fine ore is roasted in Wedge roasters and the calcines charged to one 110 x 20 ft. reverberatory furnace. This furnace is charged from the sides and uses pulverized coal for fuel both of which features tend to very efficient and economical operation. The products of these furnaces are matte and slag; the former is sent to converters and the slag is a waste product. The furnace matte contains high percentages of sulphur and iron which are taken out in converting.

Six Pierce-Smith barrel-shaped basic-lined converters are used. Air under a pressure of about 14 lb. per square inch is blown through the charge. The sulphur is burned off and quartz rock is added from time to time. The latter fuses with the iron to form slag which is skimmed off and returned to the blast furnaces. The converter matte which contains about 80 per cent nickel and copper as well as precious metals is shipped either to the refinery at Port Colborne or the Monel plant at Huntington, West Virginia. In the matte there are over two parts of nickel to one of copper.

The treatment at the *Mond Nickel Company's* smelter at Coniston differs in the preliminary treatment from that of the International. Part of the ore is concentrated by means of tables and oil flotation. These concentrates along with "fines" and flue dust are sintered on Dwight and Lloyd sintering machines and the sinter charged to the blast furnaces. Blast furnace matte is treated in Pierce-Smith converters and the converter matte shipped to Swansea, Wales. This

matte contains about 80 per cent nickel and copper, the metals being present in about equal proportions.

The smelter of the *British America Nickel Corporation* at Nickelton has been built more recently than the other two but follows closely the same metallurgical principles. The ore is smelted in two blast furnaces and furnace matte blown in converters of the Pierce-Smith type. The converter matte which contains about two parts of nickel to one of copper is granulated and shipped to the refinery at Deschenes, Quebec.

In the refinery of the *International Nickel Company* at Port Colborne the method employed is known as the Orford process. It consists of smelting the matte with salt-cake (sodium sulphate), the nickel concentrating in the "bottoms" and the copper in the "tops" of the cooled mass. Repeated smelting are necessary to complete the separation. The copper "tops" are blown in converters to blister copper while the "bottoms" are roasted and leached until completely changed to nickel oxide. The nickel oxide is smelted with charcoal in reverberatory furnaces and thereby reduced to metallic nickel. The precious metals are recovered as by-products but the Orford Process is rather inefficient as far as their recovery is concerned.

Matte for Monel metal is blown much freer of sulphur at Copper Cliff than the ordinary matte intended for the refinery. At the Monel plants the last traces of sulphur are removed. No precious metals are recovered from matte that goes into Monel metal.

The refinery of the *Mond Nickel Company* is situated at Clydach, near Swansea, Wales. The method employed was invented by Dr. Ludwig Mond and is based on the affinity of carbon monoxide for nickel. The matte is ground very fine, roasted, leached with sulphuric acid to remove most of the copper and the residue dried at a low heat. Carbon monoxide gas is passed over the material at a temperature of from 50° to 80° C. and a vapour known as nickel carbonyl is formed. The vapour is decomposed by passing it through a tower containing nickel shot heated to a temperature of 200° C. A layer of nickel is formed on the shot and the carbon monoxide is regenerated and returned to the volatilizing towers. The nickel shot is alternately exposed to and withdrawn from the action of this gas until large enough for use. The product is remarkably pure containing 99.8 or 99.9 per cent of nickel. The copper is sold as copper sulphate. It is used chiefly as an insecticide in the vineyards of France and Italy. An interesting feature of the sale of this sulphate is that the Italian peasants demand that the sulphate be packed in oak casks which when emptied are sawed in two and used as tubs. Large numbers of these casks are made in Canada and in them the matte is shipped to the refinery where they are later filled with copper sulphate.

The refinery of the *British America Nickel Company* at Deschenes, Quebec, uses the Hybinette process which gets its name from the inventor, V. N. Hybinette, a metallurgist formerly connected with the Orford refinery and also the Kristianssands Company in Norway. The granulated matte upon reaching the refinery is first used for cementing copper out of used nickel electrolyte. The latter is pumped from the nickel tanks, heated and agitated in tanks with the granulated matte. Besides freeing the electrolyte of copper, quantities of nickel are dissolved out. The matte is then removed from the tanks, roasted in Wedge roasters and leached with sulphuric acid-copper electrolyte. The copper solution is sent to the electrolytic tanks where the copper is precipitated out. Lead anodes and copper cathodes are used. The copper is stripped from the cathodes, melted in a small reverberatory furnace and cast into ingots.

The matte from which the copper has been removed by leaching is fused in electric furnaces and cast into anodes. These anodes are enclosed in canvas covered frames before being placed in the tanks. Nickel sheets are used as cathodes. During electrolysis the nickel electrolyte is kept in circulation, the fresh solution from the cementation tanks being added inside the frame and the solution for the cementation tanks being drawn off from the body of the tank. After electrolysis the residual slimes are washed from the frames and any pieces of broken anodes are returned to the anode furnace. The slimes are dried and shipped in kegs to United States smelters where the precious metals are recovered.

The nickel after being stripped from the cathodes is melted in a tilting furnace and poured into ingots or shot in which form it is sold.

Copper

The Consolidated Mining and Smelting Company of Canada, Limited, Trail, B.C., operates more than twenty mines, in addition to one of the most diversified metallurgical plants on the continent. The present plant is equipped to produce electrolytic copper in ingots or wire-bars, copper sulphate, electrolytic and antimonial lead, electrolytic zinc and zinc dust, sulphuric and hydrofluoric acids, fine gold and zinc.

The plant at Trail is divided into four parts; the lead and copper smelting unit; the zinc unit; refinery unit; and the concentrator. In addition, a concentrator is under construction at Kimberley for the treatment of ore from the Sullivan mine.

The copper-smelting equipment consists of three blast furnaces, three fore-hearths or settlers, two Great Falls type converters served by a travelling crane, a Cottrell installation for the precipitation of flue dust, and a circular casting machine for casting blister-copper anodes. Copper ores are first crushed to four-inch size, sampled by a Vezin sampler and then bedded in the storage beds, from which the blast furnace charge is drawn. The three blast furnaces are arranged parallel to each other. Each furnace has a capacity of about 600 tons per day, the size being 42 x 420 in. The molten charge runs into settlers 9 ft. in diameter, in which the matte, being heavier, settles to the bottom and is drawn off through the tap-hole, while the slag is skimmed off. Slag and other waste products are dumped over the bluff above the Columbia river.

The matte, which is a combination of sulphides of iron and copper assaying about 18 per cent copper, is next treated in converters of the Great Falls type. Quartz or ore high in quartz is added and air under a pressure of between 10 and 15 pounds per square inch is forced through. In the converter the sulphur is burned off and the quartz unites with the iron to form slag, which, being lighter than the remaining matte, is poured off. No fuel is required, as the both reactions, *i.e.*, the burning of the sulphur and formation of slag give out enough heat to keep the products molten. Converter slag being comparatively rich in copper, is taken back and recharged to the blast furnace. The converters are blown, and silica charged, until all the sulphur and iron have been eliminated, leaving only copper and the precious metals. This copper, known as blister copper, is cast into anodes 34 x 24 in. and taken to the copper refinery.

The copper refinery is housed in a steel and concrete building. There are 188 electrolytic tanks, the dimensions of which are 9 ft. 6 in. x 2 ft. 6 in. x 3 ft. 6 in. The electrolyte consists of copper sulphate and sodium chloride dissolved in sulphuric acid. The electric energy required is from 4,000 to 4,500 amperes at from 50 to 100 volts. The copper is dissolved from the anodes and redeposited on the cathodes. The precious metals and insoluble impurities settle on the bottom of the tanks in the form of slime. The slime, after being screened to remove small bits of copper, is sent to the gold and silver refinery. The cathodes are melted and cast into ingots which are either shipped in that form or worked into wire-bars in the wire-bar mill.

The Granby Consolidated Mining, Smelting and Power Co., Limited, operates a smelter at Anyox, B.C., on Observatory Inlet, about 120 miles north of Prince Rupert. The plant has a capacity of 3,000 tons per day. Pyritic smelting is practiced. There are four blast furnaces, each 50 in. wide by 30 ft. long. These furnaces are the regular type of rectangular water-jacketted matting furnace and each is served by a 12 ft. and an 8 ft. settler. A low-grade furnace matte running about 15 per cent copper is made. While most of this is charged to the converters, some is run to large beds, where it is allowed to cool, then broken up and returned to the furnaces, where it has a beneficial mechanical effect on the rest of the charge. The smelter is equipped with three 12-ft. and two 20-ft. Great Falls type converters served by two 40-ton cranes. The grade of matte is brought up to 35 per cent in the two larger converters and finished in the smaller ones.

Flue-dust is collected in exceptionally large baffled chambers and sintered in a Greenawalt sintering machine.

Recently a small concentrator has been operated for experimental purposes. The company also owns and operates coal mines at Cassidy, B.C., as well as a complete by-product coking plant.

The Britannia Copper Company constructed a new concentrator of 3,000 tons capacity at Britannia Beach, British Columbia, during 1922, to replace the one destroyed by fire in 1920. It was completed and placed in operation early in 1923. The process used in the new mill is

one of concentration by differential flotation, inasmuch as the copper sulphides are floated and the greater part of the iron is left in the tailings. The ore is crushed to pass $2\frac{1}{2}$ -in. rings at the mine before being sent to the mill, where it is reduced in successive steps by two sets of rolls until everything passes $\frac{1}{4}$ -inch Hummer screen. It is then weighed by means of weightometers and sampled. Grinding is done in 18 tube mills, size 7 x 10 ft. in closed circuit with 18 Dorr classifiers. The overflow from the classifiers goes to six 14-cell flotation machines. These machines make finished concentrates, middlings which are retreated, and tailings. The reagent used is a mixture of coal-tar creosote, pine oil and lime with minute quantities of sodium resinate. The character of the froth can be varied within limits by the amount of lime used, so that the iron sulphides may be floated or dropped at will without affecting the recovery of copper to any great extent. Flotation concentrates are dewatered by means of 3 Dorr thickeners and 2 vacuum filters. The ratio of the concentration is expected to be between 6 and 7 to 1.

Lead

At the smelter of *The Consolidated Mining and Smelting Co. of Canada, Limited*, at Trail, B.C., the lead ore, 90 per cent of which is concentrates, is first dried and pre-roasted in Wedge roasters, then sintered in Dwight and Lloyd sintering machines. The object of the sintering is to agglomerate the particles into comparatively large masses for treatment in the blast furnaces and secondly to roast off the sulphur. There are 7 Dwight and Lloyd sinterers in use. The ore, which generally contains about 14 per cent sulphur at the start of sintering operations is first treated on three of the machines, the resulting sinter containing 9 per cent sulphur, being broken up and retreated on the remaining machines with the addition of some granulated slag from the lead blast furnace. The final sinter contains about 1.5 per cent sulphur.

There are 4 lead blast furnaces, each 45 x 180 in. with a capacity of 230 tons per day. The lead is recovered as blast furnace bullion. The slag, which assays 18 per cent SiO_2 , 18 per cent zinc, 31.5 per cent iron, 9 per cent CaO , and 1.7 per cent lead, is discharged into a fore-hearth and then to a launder. It is granulated, part of it being kept for preparation of sinter and the remainder laundered to waste. The blast furnace bullion is drossed in 50-ton drossing kettles, the dross going back to the blast furnaces, while the lead is cast into anodes 29.5 x 26 x 1.125 in. weighing 320 lb. each, and taken to the lead refinery. The gases from the blast furnaces and sinterers are passed through Cottrell treaters, where the dust is precipitated. This dust forms part of the charge to sintering furnaces.

In the lead refinery the Betts electrolytic process is used. The plant has a capacity of 150 tons per day. There are 70 rows of tanks arranged seven in a row. The electrolyte contains 10 per cent hydrofluosilicic acid and from 6 to 7 per cent lead. It is quite expensive and therefore it is imperative that tanks should be leak-proof. They are made of concrete 4 in. thick, reinforced principally at the corners and lined with a mixture of oil, asphalt and sulphur. There are two sizes of tanks in use. The smaller hold 21 anodes and 22 cathodes, while in the larger there are 24 anodes and 25 cathodes. The electrolyte is cascaded from one tank to another down each row, the drop between cascades being 3 in. The average current density employed is 14.5 amperes per sq. ft. and the voltage drop 0.3 to 0.55 according to the age of the anodes and the thickness of adhering slime. Each anode is in the tank 8 days, but two crops of cathodes four days each, are taken. Slime is removed from the anodes by hand scrubbing and washing with electrolyte. Lead fluosilicate is washed out by dilute hydrofluosilicic acid and filtered off through a stationary filter. The latter is supplemented by filter presses.

The cathodes, after washing, are melted in 60-ton kettles, the melting period is 8 hours. Gradual heating follows for another 8-hour period, during which the molten lead is air-poled to remove any antimony present. During the last 8-hour period the lead is cast in stationary molds placed in a ring around the kettle. The pigs are skimmed free from dross and are then ready for shipment.

The Silver Standard Mill at Hazelton, B.C., was built in 1917 for the treatment of silver-lead-zinc ores. The mill has a capacity of 50 tons per day. The milling machinery consists of three sets of rolls, elevators, two sets of Faust jigs, three Faust tables, classifiers, screens, settling tanks, etc.

The Silversmith Mines, Limited, situated near Sandon, B.C., treated silver-lead-zinc ores in the Ivanhoe mill, which they bought and remodelled during 1922. The mill as it now stands has a capacity of 100 tons per day and produces both lead and zinc concentrates of marketable grade. The ore is reduced first by rolls, is carefully sized and concentrated in Hancock jigs which make lead concentrates. Jig tails are ground in a ball mill, classified hydraulically, and tabled on Wilfley and Deister Overstrom tables. Tables and jigs make lead concentrates only as it is not practical to separate zinc blende and spathic iron by this means. One 6 x 2 ft. Hardinge mill regrinds table tails to minus 80 mesh, the size required for flotation.

The flotation installation consists of 5 Callow cells. On the first cell a lead froth is taken off and sent to a cleaning cell, underflow from both these cells going to the third cell which is the zinc rougher. The remaining two cells are used as zinc cleaners.

The Alamo Concentrator.—This concentrator, designed for treating lead-silver ores of the Slocan district in British Columbia, is situated at Alamo on the Kalso-Nakasp Railway. The mill has a capacity of 150 tons per day. Power is furnished by a 225 h.p. Pelton wheel. The ore is ground in a Hardinge mill, classified closely in Callow travelling-belt screens and tabled on Wilfley tables of which there is a total of fifteen. The tables make lead concentrates. The table tails are reground in a Hardinge mill and the zinc sulphide recovered by flotation. The latter is done by Callow pneumatic cells. The installation consists of one double-rougher, two cleaner and one recleaner, cells. The final flotation product is tabled, the table concentrates being added to lead concentrates and the remainder which is the final zinc concentrate being dewatered by means of a Dorr thickener and an Oliver filter.

Zinc

The zinc ores of *The Consolidated Mining and Smelting Company* consist of an extremely intimate mixture of zinc in the form of blende (sulphide of zinc), lead in the form of galena (sulphide of lead) and iron in the form of pyrite and pyrrhotite (sulphides of iron), as well as gangue minerals. Ore of such complex character has been, until very recently, of little value owing to the fact that there were no methods of treatment known by which a sufficient recovery of the minerals could be made at a cost that would put the operation within the limits of economic feasibility. The ore cannot be smelted directly without the loss of the zinc and the specific gravities of the iron sulphides and blendes are so nearly alike that they cannot be separated by ordinary tabling. A system of concentration based on selective flotation has been worked out by the company's metallurgists which has proved successful in the Trail concentrator and is embodied in the new concentrator being erected by the company near Kimberley, B.C., for the treatment of ores from the Sullivan mine. As flotation is a selective and not an absolute phenomena, thoroughly clean lead and zinc concentrates are not produced but success has been attained in producing concentrates which can be successfully treated for extraction of the metals by available practical methods.

The new mill at Kimberley is designed for the treatment of 3,000 tons per day. It is situated about four miles from the Sullivan mine on a very desirable mill-site. The coarse crushing plant, however, is at the mine where the run-of-mine ore is crushed to 2½ in. size by means of a Buchanan jaw crusher followed by two Gates gyratories. It is then loaded into standard-gauge railway cars and hauled to the roll plant where it is weighed in the cars. In the roll plant the ore is reduced by successive steps in two sets of Alaska rolls to ¾-in. size. It is then sampled in the sample mill by bucket samplers and conveyed to the main mill-feed ore bin. Rotary feeders regulate the feed from the bins to the first Hardinge mills whence it is carried by conveyer-belts. There are two primary Hardinge mills 8 x 48 in. using 3-in. and 4-in. forged steel balls as the grinding medium. These mills discharge into a 10-way distributor which distributes the feed to 10 Dorr (model D) rake classifiers. These are in closed circuit with four 8 ft. x 48 in. Hardinge mills using 1¾-in. and 2¼-in. chilled balls. The overflow from the rake classifiers is pumped to 2 Dorr bowl classifiers. The sand discharge from the latter is pumped back to the ball mills and the overflow, after being sampled, goes to a 30 x 6 ft. mechanically agitated feed-stock tank. At this point grinding has reduced the ore until 95 per cent will pass through a 200-mesh screen. In ordinary flotation processes it is seldom necessary to grind so finely but it is imperative in this case on account of the close association of sulphides.

From the feed tank the ore goes to three, 18-cell Mineral Separation flotation machines, where at a pulp density of 1 : 1 and with a 1 : 1 mixture of water-gas oil and coal-tar creosote, a rough lead concentrate is taken off. The tailing from these primary or lead machines forms the feed for the machines where the zinc is separated out. The lead froth is cleaned in a series of three 8-cell machines. The tailing from the first of these is returned to the grinding circuit and the froth from the third is the final lead concentrate.

There are four, 18-cell Mineral Separation machines to be used as primary zinc machines. Up to this point it is essential that the mill-water be strongly alkaline but here copper sulphate solution is added as well as coal-tar creosote. These machines make four products (1) zinc-lead froth, (2) final zinc concentrate, (3) zinc middlings, (4) tailings. The zinc-lead froth goes to the concentrating table section for further treatment, the zinc middlings are sent to a regrinding mill. The latter is an 8 ft., Hardinge in closed circuit with a Dorr rake classifier. The grinding medium is 1¾-in. and 2½-in. chilled white iron balls. The tailings from the primary cells are sent to a Dorr bowl classifier, the overflow from which is the final mill tailing and is run to waste while the product is sent to the regrinding circuit. The overflow from the rake classifier is sent to an 8-cell flotation machine from which the tailings are sent back to the zinc primary cells and the froth to the concentrating tables.

The table section is equipped with 24 Plato tables and eight No. 11 D. Wilfleys. The feed, as mentioned, consists of the lead-zinc concentrate and tailings from the zinc retreatment machines. Three products are made (1) a lead-iron concentrate which is returned to the primary grinding circuit, (2) a middling product which is returned to the regrinding mill and (3) zinc concentrate. This completes the concentration and the final step is the dewatering of the three mill products. The lead concentrates are dewatered in 2 Diamond-Stiles type Genter vacuum thickeners and filtered in two American filters. The zinc concentrates are dewatered in two 50-ft. Dorr thickeners and filtered in three American filters. The tailings, containing chiefly iron sulphide, are dewatered in one large vacuum thickener and pumped to the tailings pond. The concentrates are shipped by railroad to reduction plants at Trail.

The electrolytic zinc plant at Trail which has a capacity of 100 tons of concentrates per day uses a process which is based on the electrolytic precipitation of zinc from a solution of zinc sulphate.

The zinc ore and concentrates are calcined in Wedge roasters at pyrometrically-controlled temperatures until the sulphur content is below 0.75 per cent. The next step is to get the zinc into solution as zinc sulphate. This is done by agitating the calcines with spent acid electrolyte in Pachuca tanks and then separating the solution from the remaining solids by means of thickeners and filters. Manganese dioxide is added to precipitate iron. After agitation the sand is reground in a ball mill and all solids submitted to flotation. In this way zinc, that has not been thoroughly roasted and therefore cannot be dissolved, is recovered. The flotation concentrates are returned to Wedge roasters. Copper, cadmium, arsenic, antimony, etc., are precipitated from the pregnant solution by the addition of zinc dust as a final step before it is clarified and sent to the tank room. The solids, from which zinc has been dissolved and solution separated by filtering, are sent to the lead smelter.

There are two tank houses each with its own electric generator. There are 448 tanks in one house and 384 in the other. Tanks are arranged in series and each cell contains 17 anodes and 16 cathodes. The anodes are made of cast electrolytic lead while the cathodes are rolled aluminum sheet. The zinc is stripped from the cathodes melted in coal-fired reverberatories and cast into slabs.

METALLIC MINERAL INDUSTRIES

ALLUVIAL GOLD MINING INDUSTRY

Owing to the seasonal nature of placer mining and the difficulties in communicating due to the isolated location of some of the fields, the Bureau has experienced difficulties in presenting a complete description covering this important phase of metal mining. Almost complete returns have been received from operators in the Yukon and it is therefore possible to compile finished tables. In addition, the Mining Lands and Yukon Branch of the Department of the Interior has supplied copies of the yearly reports of the various Mining Recorders in that Territory, and the inclusion of parts of these have added materially to the value of this report. Due to the indifference of a few of the more important individuals and companies operating in British Columbia who failed to return statements, it is impossible to publish complete data for that province comparable to the figures given below for the Yukon Territory.

In the latter section, reports received accounted for over 93 per cent of the gold recovered; in British Columbia only a little more than 50 per cent of the known production as reported by the Department of Mines in British Columbia was accounted for by returns received at this Bureau. It is apparent, therefore, that the data for the latter province would be most incomplete and no information covering wages, employment or equipment has therefore been given. The gold not accounted for on returns from the Yukon, represents the small winnings of a number of isolated and itinerant prospectors with whom no communication could be had. The figures of placer gold production shown are as supplied by the Mining Lands and Yukon Branch and the Department of Mines in British Columbia.

In the Yukon, six joint stock companies and 40 establishments (partnerships and individuals), operated during 1922 and employed 353 men to whom \$506,521 was paid in wages. A total 67,961·73 crude ounces of gold was recovered during the calendar year, on which export tax was paid.

The mining season commences generally in May of each year and closes around November 1st, after which time the gravel cannot be treated. Some dredges, however, are equipped to operate for a longer period. During 1922, the production from the hydraulic mines was materially affected by the exceptionally early and severe frosts which entirely shut off the water supply before the cuts could be properly cleaned up.

For purposes of governmental supervision the Yukon Territory is divided into two mining districts known as the Dawson and the White Horse Districts, over each of which a Mining Recorder is placed. The first mentioned district produced 67,799·92 crude ounces while White Horse accounted for only 161·81 crude ounces. The monthly record of this production is shown in the chapter on "Gold" in the first part of this report. An excerpt from the report of the Gold Commissioner at Dawson described the operations of a few of the more important producers in the Dawson district and is included here for the more detailed information it gives, as compared with the general tables below dealing with the whole area.

Yukon Gold Company

This company operated one dredge on Gold Run Creek during a dredging season of 130 days from May 25th to September 29th, handling 578,395 cubic yards of material.

Eight hydraulic mines were operated at the following points: Adams Hill, King Solomon, Oro Fino Hill, Trail Gulch, Lovett-Hosford, American Gulch, Cheechaco and Gold Hill, and 1,586,666 cubic yards was handled.

The hydro-electric power plant of the company on the Twelvemile River furnished adequate power for the dredging and other operations of the company requiring power. The daily average of men employed during the mining season was as follows:—

Dredges and thawing (April to October)	47
Hydraulic mines	42
Ditch	31
Otherwise employed	23
Total.	143

Burrall and Baird, Limited

This company operated dredges Canadian Nos. 2 and 4 in the Klondike valley on Hydraulic Mining Leasehold No. 18 and Dredging Lease No. 24. Dredge No. 2 operated from the 14th of May to the 23rd of September, handling 1,559,329 cubic yards of material. Dredge No. 4 operated from the 12th of May to the 14th of December, handling 2,260,114 cubic yards.

In addition to these major operations, prospecting was carried on with a Keystone Drill and a prospecting tunnel was driven 940 feet into Jackson Hill with a view of carrying on hydraulic operations at this point during the coming summer.

The pumping plant of the company near the mouth of Hunker Creek was in operation during the summer. The company's machine shops at Bear Creek, and other auxiliary work was carried on as usual. An average of 76 men were employed by this company throughout the season.

The New North West Corporation, Limited

This company operated dredge North West No. 1 on Below Lower Discovery Dominion Creek from the 27th May to the 8th of November, and dredged in that period 373,064 cubic yards of material. Dredge North West No. 2 operated on the Granvill's Flat on Dominion Creek from the 3rd of June to the 7th of November, and handled 582,296 cubic yards of material.

The Hydro-electric power plant of the company at the North Fork of the Klondike River furnished adequate supply of power for the operation of these dredges, machine shops, etc., and also the dredges of the Burrall and Baird, Limited, operating in the Klondike valley. An average of 115 men were employed by this company throughout the season.

Hihget Mining Company, Limited

This company, the successor of the Titus Dredging Company operated their dredge on Hihget Creek throughout the season. An average of 20 men were employed in this operation.

Other Placer Operations

Mr. Nevill A. D. Armstrong carried on extensive prospecting operations on Russell Creek, a tributary of the MacMillan River, and reports a large area of ground suitable for dredging operations. Further work will be carried on during the coming summer.

Collins, Weinberg and Collins operated their ground on Miller Creek in an extensive manner, both winter operations, and hydraulicking during the summer with very satisfactory results.

In general the individual operations carried on throughout the various parts of the Camp were satisfactory to the operators.

Table 215.—Summary Statistics of Placer Mining in the Yukon Territory in 1921 and 1922

Item	1921	1922
Time in operation.....months	6-8	6-8
Number of wage-earners.....	428	374
Wages paid.....	\$671,783	\$514,196
Crude ounces gold recovered.....	82,394	67,962
Value of gold and silver.....	\$1,343,022	\$1,095,547
Quicksilver purchased.....lb.	320	576
Quantity of material handled.....cubic yards	†5,148,750	†7,186,723
Length of ditches.....miles	186	184
Machinery installed—		
Giants.....	*34	58
Dredges.....	6	6
Capacity of dredges, cubic yards per 24 hours.....	3,000	3,000
Excavators.....	1	1
Scrapers.....	2	2

* Only 13 were used, on account of low water.
† Joint Stock Companies only.
‡ Includes all operators, several of whom could not report the yardage handled.

THE AURIFEROUS QUARTZ MINING INDUSTRY

The auriferous quartz mining industry includes that group of mines which produce an ore, the main constituent of which is gold and which may be recovered either by amalgamation or cyanidation. This group is important in Ontario where the noted mines of the Porcupine and Kirkland Lake areas are operated. The ores mined are treated, in cyanide mills on the properties. In British Columbia some mines of this group export their ores or concentrates. Another closely allied group is the copper-gold-silver comprising mines which concentrate their ores, shipping the gold or silver-bearing copper concentrates to smelters for treatment; this latter group, which is important in British Columbia is treated in the following section.

In Canada, during 1922, there were 74 auriferous quartz mines operating and of these 46 produced bullion or shipped ores while 28 carried on development operations only. In order of importance the provinces with the number of operating mines in each, were Ontario, 41; British Columbia, 18; Nova Scotia, 11; and Manitoba, 4 mines. The mines of the province of Ontario produced over 90 per cent of the gold derived from this group and despite the serious shortage of hydro-electric power which occurred early in the year the output was the greatest yet achieved, bringing the province of Ontario very prominently before the eyes of the mining world. In Table 218 there is a record for the years 1921 and 1922 giving comparative statistics for this group. The figures for 1922, showed 2,431,340 tons mined, as against 2,342,213 tons of ore cyanided (which included practically all ores milled). The increase over the 1921 figures in ores cyanided was 612,787 tons. Crude bullion shipped amounted to 1,279,266 ounces valued at \$21,037,732 in 1922, as against 913,869 ounces valued by the mines at \$14,774,037 in 1921. These figures which take no account of the gain made in exchange premiums give some indication of the important and far-reaching changes which are occurring in the gold mining industry particularly in the province of Ontario.

Economic conditions which were improving throughout the world during 1922, tended to intensify the urgent need for gold on the part of most countries. During the war and after, the world's annual production of gold actually declined about 23 per cent, owing to the increased cost of material and labour, so that in addition to the extra need of gold to make up the discrepancy between paper money and its gold-backing there is also the necessity of making good the deficiency in production. Conditions, therefore, clearly point to the importance of an increased gold production. The following figures emphasize the shortage in this metal and the increasing importance of Canada's position as a gold producer, as compared with South Africa, the world's greatest producer.

Table 216.—Comparative Figures of Gold Production, for the World, South Africa and Canada, 1922

Year	World's Output	South Africa's Output	Canada's Output
	fine ounces	fine ounces	fine ounces
1915.....	22,593,833	10,538,588	918,056
1921.....	15,954,788	9,031,328	926,329
1922.....	15,364,650	8,198,000	1,263,364

Rapid progress was made throughout 1922 at nearly all properties in both Porcupine and Kirkland Lake. The Hollinger, McIntyre, Dome, Clifton-Porcupine and Paymaster and many other properties in Porcupine operated at capacity and developed important deposits of gold-bearing veins at depth. In Kirkland Lake, the Teck-Hughes, Lake Shore and Wright-Hargreaves continued to develop to lower levels, while other companies carried on important operations. In Manitoba, much staking was done in the Elbow Lake country and new capital was reported as being invested in different well-known properties in that province. The Premier Mine in Northern British Columbia continued to produce high-grade gold-silver ore which was concentrated and exported mainly to the United States. The Nickel Plate Mine of the Hedley Gold Mining Company resumed operations and high-grade gold-bearing ore was exported from the I.X.L. Mine. In Nova Scotia a renewed interest in gold mining was noted and while the figures of production were low compared to the output of more prosperous times, the indications from the various activities displayed pointed to more important developments in the future.

The province of Quebec which is not yet represented in this group by producing mines, may yet take its place. During the last quarter of 1922 interesting finds of gold-bearing quartz were reported in Rouyn township, the section lying due east of Kirkland and Larder Lakes. Much staking of claims was reported by the end of the year.

Statistics of capital employed in the gold-mining industry for 1921 covered the following; capital invested in (1) cost of lands, buildings, plant, machinery and tools, (2) cost of supplies and stocks on hand and (3) cash, trading and operating accounts. Since many mining lands are held by organized companies in fee-simple having been crown-granted, the capital invested in the land is often represented largely by shares of the capital stock. There are also cases where sums of money have been paid out as part payment but on the whole the proportion of cash to stock would be small. For this reason the 1922 questionnaire for this group took no account of actual capital invested in land and the totals shown for the year refer to (1) cost of buildings, plant, machinery, and tools, (2) cost of supplies and stock on hand and (3) cash, trading and operating accounts. The compilations as made from these two sets of returns, notwithstanding the increase in the number of companies shows a much greater variation than might be expected. The figures show that for the year 1922 the capital employed in operating 76 mines was \$35,368,094 as against \$47,919,727 for 57 mines in 1921.

The number of producing mines increased from 32 in 1921 to 38 in 1922, and as pointed out above, showed remarkable gains not only in ores mined but also in quantities cyanided. But while the ores cyanided increased by about 35 per cent it is important to note that the number of crude ounces of bullion recovered, as reported by the operators increased by nearly 39 per cent, indicating that richer ores were treated in 1922 than in 1921. Bullion shipped rose from 913,869 crude ounces in 1921 to 1,279,266 ounces in 1922, with corresponding increases in the precious metal contents. In 1922 the net value of the bullion shipped was \$21,037,732 as against \$14,774,037 in 1921. These figures take no account of the gains made in the exchange premium. In 1921 this amounted to well over one million dollars and in 1922 to \$209,266.

The shipments of ores by this group of mines were mostly from the province of British Columbia. The different fields in that province have not yet applied the cyanide process so generally as in Ontario, although at the Premier Mine, Nugget Gold Mine and the Nickel Plate Mine it is in use. In other cases the gold ores now being worked do not lend themselves so readily to the cyanide treatment, and the custom is generally to concentrate and ship the product to copper smelters. A case of this kind is that of the Hedley Gold Mining Company, the ore of which carries arsenic in addition to important quantities of gold and silver. Part of the precious metal was recovered by cyanidation, and the concentrates exported. Another property (IXL Mine) produced a high grade of gold ore, which was hand-picked and shipped direct to smelters.

The quantity shipped rose from 16,268 tons in 1921 to 78,627 tons in 1922, the net values of which to the mines were \$1,915,747 and \$4,872,904 respectively. This large gain was mainly accounted for by the continued development of the Premier Mine in the northern part of the province. This property produces a precipitate very heavy in silver and, in addition shipped high-grade ores and concentrates to Tacoma, Washington, U.S.A., and to Anyox, B.C.

There were increases in the number of salaried employees in both British Columbia and Ontario gold mines. The figures for Nova Scotia and Manitoba were small, since no large organizations for gold mining were in existence in those provinces. The number of major officers in the operating companies increased from 232 to 364, and salaries paid rose from \$553,307 to \$873,161.

Important increases occurred during 1922 in the number of wage-earners employed in the gold-mining group. In the more highly developed areas these increases were pronounced, and especially in Ontario, where the wages paid increased from \$4,695,383 to \$6,228,784. The number employed in Canada, both on surface in mill and below ground, which totalled 3,651 in 1921, increased gradually, until by the end of 1922, 5,060 were employed, or 38 per cent more than in the previous year, indicating a very considerable expansion in the industry.

During 1922 the fuel costs, both in Ontario and British Columbia, decreased, due to the fact that hydro-electric power was used to a larger extent, and that expenses for coal, fuel-oil and gasoline were greatly reduced. The value of wood consumed increased from \$28,052 in 1921 to \$83,491 in 1922 in the province of Ontario. This is usual where much of the timber

Table 217.—Capital Employed in the Auriferous Quartz Mining Industry in Canada,
1921 and 1922

Province	1921						1922					
	Producing		Operating but not producing		Total		Producing		Operating but not producing		Total	
	No.	Capital	No.	Capital	No.	Capital	No.	Capital	No.	Capital	No.	Capital
		\$		\$		\$		\$		\$		\$
Nova Scotia.....	8	391,834	0		8	391,834	9	60,500	2	7,000	11	67,500
Ontario.....	11	28,752,321	22	9,746,603	33	38,498,924	13	25,299,933	33	5,994,959	46	31,294,892
Manitoba.....	2				2	*	2				2	*
British Columbia.....	11	8,612,079	5	416,890	16	9,028,969	14	3,925,278	6	80,424	20	4,005,702
Canada.....	32	37,756,234	27	10,163,493	59	47,919,727	36	29,285,711	41	6,082,383	79	35,368,094

* Data not available.

	Nova Scotia	Ontario	Manitoba	British Columbia	Canada
1921					
Number of producing mines.....	8	11	2	11	32
Ore mined..... tons	726	1,867,848	683	39,029	1,908,286
Ore milled..... " "	696	372,083	484	200	373,463
Tailings retreated..... " "				1,401	1,401
Bullion recovered by amalgamation..... crude oz.	465	76,063	265	117	76,910
Ores cyanided..... tons		(a) 1,716,946		(b) 12,480	1,729,426
Bullion recovered by cyanidation..... crude oz.		836,745		5,117	841,862
Bullion shipped..... " "	(c) 451	907,572	305	5,234	913,869
Contents of bullion shipped—Gold..... fine oz.	418	707,164	207	3,311	711,100
Silver..... " "	21	120,335	33	356	120,746
Net value..... \$	8,470	14,693,402	4,206	67,959	14,774,037
1922					
Number of producing mines.....	9	13	2	14	38
Ore mined..... tons	6,107	2,272,868		152,367	2,431,340
Ore milled..... " "	6,006	368,400	120	74,567	449,080
Tailings retreated..... " "				3,000	3,000
Bullion recovered by amalgamation..... crude oz.	768	135,066	103	1,042	136,979
Ores cyanided..... tons		(f) 2,268,306		73,477	2,342,213
Bullion recovered by cyanidation..... crude oz.		1,123,902		18,025	1,141,927
Bullion shipped..... " "	(d) 683	1,259,378	(e) 120	19,085	1,279,266
Contents of bullion shipped—Gold..... fine oz.	555	999,469	103	17,294	1,017,421
Silver..... " "	33	163,622	13	1,196	164,854
Net value..... \$	12,389	20,745,268	2,131	277,945	21,037,732
Amount of exchange premium (g).....		208,717	9	539	209,266

(f) Includes 368,400 tons amalgamated.
(g) Figures for exchange premiums in 1921 not available by provinces.

Table 219.—Ores, Concentrates and Slags Shipped from the Gold Mines in Canada, 1921 and 1922

	Ontario Mines Shipping		British Columbia Mines Shipping		Canada
	To Canadian Smelters	To American Smelters	To Canadian Smelters	To American Smelters	
1921					
Number of mines.....		1	9	4	11
Tons of ore, etc., shipped.....		43	9,787	6,481	16,311
Metal contents—					
Gold.....ozs.		870	1,830	49,971	52,671
Silver.....“		3,730	54,341	1,536,921	1,594,992
Copper.....lb.		2,192	2,808		5,000
Net Value.....\$		19,640	72,087	1,824,020	1,915,747
1922					
Number of mines.....		2	7	7	15
Tons of ore, etc., shipped.....		33	30,950	*47,677	78,660
Metal contents—					
Gold.....ozs.		1,299	28,104	†104,913	134,316
Silver.....“		2,084	848,839	3,638,800	4,489,723
Copper.....lb.			213	2,808	3,021
Net value.....\$		13,484	1,687,686	3,171,734	4,872,904

* Contains one ton of slags.
† Contains 731 ozs. crude base bullion.

Table 220.—Employees, Salaries and Wages in the Auriferous Quartz Mining Industry in Canada by Provinces, 1921 and 1922

Province	1921						1922					
	Number of Employees					Salaries and Wages	Number of Employees					Salaries and Wages
	On Sal-ary	Wage-Earners			Total Em-ployees		On Sal-ary	Wage-Earners			Total Em-ployees	
		Sur-face	Under-ground	Mill		\$		Sur-face	Under-ground	Mill		\$
Nova Scotia.....	6	21	19	13	59	48,065	4	30	19	(a)	53	25,973
Ontario.....	204	505	1,931	609	3,249	5,188,082	314	1,469	2,548	387	4,718	6,998,901
Manitoba.....	4	19	19	7	49	17,963	1	30		(a)	31	8,457
British Columbia.....	24	331	135	42	532	816,208	62	364	213	(a)	639	978,351
Canada.....	238	876	2,104	671	3,889	6,070,318	381	1,893	2,780	387	5,441	8,011,682

(a) Mill employees included with Surface.

Table 221.—Number of Wage-Earners in the Auriferous Quartz Mining Industry in Canada by Months, 1922

Month	Mine		Mill	Total
	Surface	Under-ground		
January.....	1,301	2,252	357	3,910
February.....	1,274	2,299	353	3,926
March.....	1,345	2,356	358	4,059
April.....	1,538	2,296	371	4,205
May.....	1,713	2,467	392	4,572
June.....	1,886	2,724	390	5,000
July.....	1,878	2,857	399	5,134
August.....	1,897	2,840	400	5,146
September.....	1,978	2,918	394	5,290
October.....	1,982	2,740	400	5,122
November.....	1,961	2,853	408	5,222
December.....	1,817	2,885	396	5,098
Average.....	1,893	2,780	387	5,060

Table 222.—Miscellaneous Expenses in the Gold Mining Industry in Canada, by Provinces, 1921 and 1922

	1921	1922
	\$	\$
Nova Scotia.....	18,615	7,804
Ontario.....	4,831,339	6,246,657
Manitoba.....	4,872	4,127
British Columbia.....	619,781	1,124,928
Canada.....	5,474,607	7,383,516

THE COPPER-GOLD-SILVER MINING INDUSTRY

The most important deposits of this group are found in British Columbia, from which province the greater portion of Canada's copper production is derived. This class of mines, as indicated by the group name, produces ores which are predominantly copper-bearing, although important quantities of gold and silver are also present. Broadly speaking, these ore deposits may be divided into two classes, viz., low-grade and high-grade copper ores, but there are many deposits which it is difficult to classify under either heading. The former class, which is presently the more important, comprises those areas which contain from one to two per cent of copper, and is represented by such properties as the Britannia on Howe Sound, and the Hidden Creek, near Anyox, in the northern part of the province. The higher grade deposits, of which there are many, have not been so well developed, and are smaller in size. This group was represented during 1922 by such mines as the Maid of Erin and the Venus, the copper content of the ores from these mines ranging from 20 per cent to 9 or 10 per cent. The entire group in 1922 consisted of 18 active mines only, 10 of which shipped ore. Of the 18 properties, 16 were located in British Columbia, 1 in Ontario, and 1 in Quebec, the last two mentioned carrying on development work only.

Due to the fact that the Britannia Mining and Smelting Company, formerly one of the largest producers, was inactive during 1922, and as the figures for capital employed by that company were as a consequence not included in the compilation, the capital employed in this industry is shown as \$27,091,085 in 1922, as against \$29,183,349 in 1921. There was included in these totals the actual capital invested by the Granby Mining, Smelting and Power Company, as copper-producing was the most important department of that large company, which, in addition to copper mines and a copper smelter, operates large coal mines, coke-making plants, quartz and limestone quarries. The figures for that company, which are included here, are not again repeated in the totals for capital employed in coal mines. The capital invested by the Consolidated Company at Trail and elsewhere, which company also produces copper ores, is included under the silver-lead-zinc section since its largest and most important property is a lead-zinc mine and the company's products are therefore principally lead and zinc in addition to copper. The capital employed by active mines does not show any great changes from year to year, unless several highly developed properties commence operating in a single twelve-month period. The figures given in the following table represent capital invested in tangible improvements and are relative only, in that they do not include important sums used for provisions, wages and so forth, spent in connection with prospecting.

The period under review was a difficult one for copper producers throughout the entire world. The continued dullness in the copper markets and the low price of 13½ to 14 cents, interfered largely with the output from this group. Both 1921 and 1922 were poor years, but the record for the latter period was much below that of the former. In 1921 some 1,042,135 tons of ore were shipped from the mines, while in 1922 the total only amounted to 911,587 tons. Despite the slackness in markets, some of the large producers in British Columbia undertook important improvements. The Granby Company enlarged its crushing department and improved the hydro-electric power plant. The Britannia Company replaced the large concentrator plant so unfortunately destroyed by fire during the previous year. The holdings of these two companies, along with those of the Consolidated Mining and Smelting Company, represent some of the most important in Canada, and under more favourable conditions could increase

the production of copper very largely. The province of British Columbia is by far the most important producer of copper in Canada, and might safely claim to be the largest in the British Empire.

There are also important copper deposits in Manitoba, Ontario, Quebec, some of which have passed the development stage. None of these properties shipped ore during 1922.

During 1922 the shipments of ores and concentrates from the mines fell off by over 100,000 tons, due to the continued idleness of some large properties and decreased shipments from those which continued to operate. As mentioned above, the price of copper, which remained around the low figure of 13½ cents, made it impossible for some mines, in the face of high costs for wages and materials, to operate economically. From an examination of the table given below it will be observed that the net value to the mines was approximately a half-a-million dollars less in 1922 than in 1921, and that while for the most part the tonnages shipped fell off, the quantity of ore exported to the United States increased from some fourteen thousand tons to more than thirty thousand. It should be pointed out, however, that there was a largely increased shipment of flue dust from Anyox. Deducting the quantities of flue dust shipped in both years, the record stands as 4,740 tons of ore exported in 1922, as against 7,855 tons in 1921.

Salaried officials dropped from 85 to 46 in number, while the salaries paid to them decreased from \$197,685 to \$98,939. The number of wage-earners decreased from 1,141 to 780 and wages paid from \$1,878,776 to \$1,051,336.

Table 223.—Capital Employed in the Copper-Gold-Silver Mining Industry in Canada, 1921 and 1922

	British Columbia		Ontario		Canada	
	1921	1922	1921	1922	1921	1922
	\$	\$	\$	\$	\$	\$
Producing Mines.....	28,735,938	26,961,448			28,735,938	26,961,448
Operating but not producing mines.....	447,411	123,637		6,000	447,411	129,637
Total.....	29,183,349	27,085,085		6,000	29,183,349	27,091,085

Table 224.—Shipments from Copper-Gold-Silver Mines of Canada, 1921 and 1922

Destination	Quantity	Net Value *	Contents as Determined by Settlement Assay			
			Gold	Silver	Copper	Sulphur*
			fine ozs.	fine ozs.	pounds	pounds
1921						
10 Mines shipped to Canadian smelters—	tons	\$				
Ores.....	(a) 1,002,935	1,755,559	50,852	377,849	32,408,805	1,166,734
Concentrates.....	715	12,830	738	931	29,021	
6 Mines shipped to foreign smelters—						
Ores.....	(b) 14,463	36,828	296	9,259	709,034	416,189
Concentrates.....	24,022	784,097	37,097	30,351	2,240,766	
Total.....	1,042,135	2,589,314	88,982	418,390	35,387,626	1,582,923
1922						
4 Mines shipped to Canadian smelters—						
Ores.....	(c) 870,579	1,062,426	15,252	399,113	29,432,782	
Concentrates.....	168	3,050	179	242	7,426	
5 Mines shipped to foreign smelters—						
Ores.....	(d) 30,740	269,976	466	38,833	1,792,327	
Concentrates.....	10,100	696,219	32,556	31,535	1,292,257	
Total.....	911,587	2,031,671	48,453	469,723	32,524,792	

* Not given in 1922.

(a) Includes 3,597 tons pyrites used for manufacture of sulphuric acid.

(b) Includes 6,608 tons flue dust.

(c) Included 4,819 tons pyrites valued at \$5,460, sold for sulphur content.

(d) Includes 26,002 tons of flue dust.

Table 225.—Miscellaneous Expenses in the Copper-Gold-Silver Mining Industry in Canada, 1921 and 1922

	1921	1922
	\$	\$
Producing Mines.....	1,159,843	374,478
Operating but non-producing mines.....	32,175	11,015
Total.....	1,192,018	385,493

Table 226.—Employees, Salaries and Wages in the Copper-Gold-Silver Mining Industry in Canada, 1921 and 1922

	1921			1922		
	Number of Employees		Salaries and Wages	Number of Employees		Salaries and Wages
	Male	Female	\$	Male	Female	\$
SALARIED EMPLOYEES—						
Superintendents and managers.....	23		90,592	12		41,174
Technical employees.....	21		43,759	10		19,417
Clerks, stenographers.....	37	4	63,334	22	2	38,348
Total.....	81	4	197,685	44	2	98,939
WAGE-EARNERS—						
Surface.....	369		1,378,776	318		1,051,336
Underground.....	772			462		
Total.....	1,141		1,378,776	780		1,051,336
Grand Total.....	1,222	4	1,576,461	824	2	1,150,275

Table 227.—Number of Wage-earners in the Copper-Gold-Silver Mining Industry in Canada, by Months, 1922

Month	Number of Wage-Earners		
	Surface	Under-ground	Total
January.....	297	475	772
February.....	287	451	738
March.....	279	475	754
April.....	267	456	723
May.....	277	463	740
June.....	286	474	760
July.....	263	431	694
August.....	272	425	697
September.....	250	392	642
October.....	246	418	664
November.....	253	446	699
December.....	259	438	697
Average.....	318	462	780

THE NICKEL-COPPER INDUSTRY

The nickel-copper mining, smelting and refining industry, which is carried on almost entirely in the province of Ontario, has long been famous as the world's main source of a very large proportion of the nickel used in industry. The mines and smelters are situated in the vicinity of Sudbury, Ontario, where three companies are engaged in mining and smelting, producing a matte which runs on the average about 50 per cent nickel and 32 per cent copper the balance consisting of iron and sulphur. The three companies are the Mond Nickel Company, International Nickel Company of Canada, and the British America Nickel Corporation. The first of these companies has always shipped its matte to Swansea, Wales, for treatment; the second

operates a large refinery at Port Colborne, Ont., where in 1922 part of the matte was treated and the products made were converter copper, nickel shot, nickel oxide, and residues containing the precious metals: gold, silver, platinum and other metals of the platinum group. This company also exported some of its matte to Huntingdon, West Virginia, and in addition to the nickel-copper matte of the ordinary shipping grade produced monel metal, an alloy which contains about 78 per cent nickel and 22 per cent copper. The refinery of the British America Nickel Corporation is located at Deschenes, Que., where the matte from the smelter at Nickelton is treated electrolytically. The products made are electrolytic nickel, electrolytic copper, and residues containing gold, silver, and metals of the platinum group.

Table 228.—Capital Employed in the Nickel-Copper Industry in Canada, 1921 and 1922

	1921	1922
Buildings, plant machinery and tools:—		
Mines.....	\$ 8,107,245	\$ 8,082,571
Smelters.....	13,725,398	14,040,519
Refineries.....	8,578,187	9,202,003
Cost of materials and supplies on hand.....	10,467,385	4,108,969
Cash, trading and operating accounts and bills receivable.....	4,062,590	1,151,035
Total.....	\$44,940,865	\$ 36,585,097

Table 229.—Output from Nickel-Copper Mines and Smelters in Canada, 1921 and 1922

	1921	1922
Ore mined (a)..... Tons	262,593	259,569
Ore shipped..... "	262,593	259,569
Contents of ores, etc., shipped:		
Copper..... Lb.	9,491,327	9,177,306
Nickel..... "	13,991,604	14,127,554
Ore concentrates treated at smelters..... Tons	393,768	314,120
Matte produced..... "	19,497	17,324
Contents of matte:		
Copper..... Lb.	12,645,391	10,841,647
Nickel..... "	19,256,900	17,355,056
Matte shipped to Canadian Refineries..... Tons	6,643	10,065
Matte exported to foreign refineries..... "	10,465	19,831

(a) Includes ore from Bruce Mines, in 1921.

Table 230.—Output from Nickel-Copper Refineries in Canada, 1921 and 1922

		1921		1922	
		Quantity	Value	Quantity	Value
Matte received.....	Tons	6,648	\$	10,065	\$
Matte treated.....	"	5,558		10,340	
Products made—					
Refined nickel.....	Lb.	1,583,600	554,260	11,065,473	3,140,399
Nickel shot and ingots.....	"	3,835,574	1,267,657		
Nickel oxide.....	"	7,812,673	1,582,066	2,389,840	389,398
Nickel castings.....	"	14,522	5,896		
Converter and refined copper.....	"	2,926,407	330,084	4,382,922	502,293
Gold.....	Fine ozs	179	3,700	213	4,275
Silver.....	"	8,818	5,525	12,212	8,016
Platinum.....	"	269	20,184	49	4,662
Palladium.....	"	591	38,267	59	3,104
Iridium and rhodium.....	"	56	9,690	4	170
Total value.....			3,817,329		4,052,317

Table 231.—Salaried Employees by Classes, and Salaries Paid in the Nickel-Copper Industry in Canada, 1922

	At the Mines		At the Smelters			At the Refineries		
	Male	Salaries paid	Male	Female	Salaries paid	Male	Female	Salaries paid
Superintendents, managers, etc.....	10	\$ 40,276	13	.....	\$ 69,970	6	.....	\$ 44,100
Technical employees—								
Engineers, surveyors, chemists, draughts-	2	5,250	19	.....	45,385	17	.....	22,029
men, etc.....	6	12,535	19	11	54,868	50	8	76,261
Clerks, stenographers, etc.....								
Total.....	18	58,061	51	11	170,223	73	8	142,390
Total for 1921.....	39	109,385	74	4	242,790	71	7	150,816

Table 232.—Number of Employees by Months and Wages Paid in the Nickel-Copper Industry in Canada, 1922

Month	At the Mines			At the Smelters	At the Refineries	Total
	Surface	Under ground	Total			
	No.	No.	No.	No.	No.	No.
January.....	183	308	491	689	593	1,773
February.....	198	358	556	793	602	1,951
March.....	208	389	597	831	606	2,034
April.....	129	150	279	402	70	751
May.....	140	156	296	414	234	944
June.....	149	165	314	446	321	1,081
July.....	164	160	324	460	458	1,242
August.....	177	170	347	513	492	1,352
September.....	195	230	425	687	520	1,632
October.....	191	244	435	667	515	1,617
November.....	205	268	473	668	577	1,718
December.....	226	321	547	701	561	1,809
Total wages 1922.....			\$532,981	\$799,831	\$676,523	\$2,009,335
Total wages 1921.....			\$624,851	\$953,582	\$401,541	\$1,979,974

Table 233.—Miscellaneous Expenses in the Nickel-Copper Industry in Canada, 1921 and 1922

Branch of Industry	1921	1922
Mines and mills.....	\$ 641,036	\$ 608,809
Smelters and refineries.....	1,729,995	4,015,618
Total.....	2,371,031	4,624,427

THE SILVER-COBALT MINING INDUSTRY

Due to the favourable development of the mines and a generally improved economic situation, the year 1922 marked an important advance over 1921 in the production of silver from the mines of the Cobalt district. The most important feature observed from comparative figures for the past years mentioned, was the decline in operating costs. In 1921, some 21 properties carried on active operations while 11 more, though not producing, made shipments from ores, mined in other years. In 1922 the producing properties totalled 20 in number; ore mined, increased from 398,931 tons to 426,445 tons, while the wages paid, notwithstanding the increased tonnage produced, fell from \$1,440,144 to \$1,176,279.

During the year the most prominent producer was the Nipissing Mines, Limited, from which some 3,864,000 ounces was produced. The Mining Corporation of Canada which operated the Buffalo, Townsite, City of Cobalt, and Cobalt Lake Mines, at Cobalt proper, and the Haileybury-

Frontier in the South Lorrain area, was the second largest producer with about 1,275,000 ounces, and was closely followed by the Coniagas and the O'Brien. The La Rose mine continued to produce during the period, having its ores treated on a customs basis at the Bailey customs concentrator, while the McKinley-Darragh resumed production towards the middle of the year. One of the important incidents was the leasing of the Beaver Mine by the Coniagas Mining Company which indicated the resumption of activity in the southern portion of the field. Among other new operations commenced the most important was on the Colonial Mine by the Menago Mining Co., Ltd. The indications during the period were that this enterprise would develop as a producer in the near future. Encouraging finds of silver were also made on the Genesee property at a depth of about 350 feet. In the South Lorrain field which is about 20 miles south of the Cobalt area, the Keeley Mines produced high-grade ore and ranked among the leaders of the district. At the close of the year the continued success encountered on this property indicated a prosperous future for the company. The Mining Corporation of Canada during the period secured a larger acreage in this field and at the end of the year controlled the Haileybury-Frontier, Little Keeley, Crompton, Forneri and Haileybury Silver. The production of silver from the Haileybury-Frontier was important and amounted to about 500,000 ounces. The ore from this property was hauled by tractor to Cobalt and there treated in the works of the company. The total silver contained in ore shipped from South Lorrain amounted to about 1,284,000 ounces. In Gowganda, a field situated about 30 miles west of Cobalt, the chief operators were the Miller Lake-O'Brien and the Castle-Tretheway. About 170,650 ounces in ore was produced and shipped from this camp during the period.

Treatment of the ore by concentration and cyaniding was carried on during the period by the Keeley Mines, Ltd., in South Lorrain, the Miller Lake-O'Brien Mine in Gowganda, and the Nipissing Mines, Ltd., Mining Corporation, including the Buffalo Mine and the Cobalt Reduction Company, Coniagas Mines, Dominion Reduction Company, McKinley-Darragh-Savage Mines, and by the Bailey Silver Mines in Cobalt. In the month of September, the O'Brien mill and cyanide plant was destroyed by fire. A little later in the year this company secured by purchase the customs concentrator known as the Bailey.

The total quantity of ore and tailings treated in 1922 was 521,797 tons and from this there was derived 5,480 tons of concentrates. Considerable portions of the concentrates obtained from the treatment of these ores were shipped to the Deloro Smelter and to the Coniagas Reduction Company's works at Thorold; some were also exported to the United States.

Table 234.—Capital Employed in the Silver-Cobalt Mining Industry in Canada, 1921 and 1922

Capital employed as represented by—	1921	1922
	\$	\$
Cost of lands, buildings, and equipment.....	21,913,897	22,190,416
Cost of supplies and stock on hand.....	1,580,871	960,121
Cash, trading and operating accounts and bills receivable.....	7,703,650	6,309,066
Total.....	31,198,418	29,459,603

Table 235.—Principal Statistics of Silver-Cobalt Mines and Mills Operating in Canada, 1921 and 1922

	1921	1922
Number of mines in operation.....	39	30
Ore mined.....	Tons 398,951	426,445
Ores treated.....	Tons 402,201	405,640
Tailings treated.....	Tons 20,139	91,369
Concentrates produced.....	Tons 4,290	5,099
Treated in Customs concentrators.....	Tons 36,972	24,788
Concentrates produced.....	Tons 671	381
Quantity of Material cyanided.....	Tons 211,729	273,597
Bullion recovered.....	Fine Ounces 5,452,773	6,820,686
Bullion sold.....	Fine Ounces 5,173,952	7,526,646
Net value to operators.....	\$ 3,480,519	\$ 5,125,802

Table 236.—Shipments of Ores, Concentrates and Residues from the Cobalt Camp, 1921 and 1922

Kind	Tons	Gross Value (a)	Net Value (b)	Metallic content paid for		
				Silver	Cobalt	Copper
		\$	\$	fine ozs.	lb.	lb.
1921						
<i>To Canadian Smelters—</i>						
Ores.....	431.19	611,970	589,712	833,211	97,100	.....
Concentrates.....	1,726.57	1,369,751	1,284,477	1,970,666	145,066	13,929
<i>To Foreign Countries—</i>						
Ores.....	202	35,181	27,436	45,527	.....	24,257
Concentrates.....	822	292,454	257,204	445,177	.....	.....
<i>Total Shipments—</i>						
Total ore and concentrates.....	3,181.76	2,309,356	2,158,829	3,294,581	242,166	38,186
1922						
<i>To Canadian Smelters—</i>						
Ores.....	804	971,221	912,387	1,442,551	235,454	.....
Concentrates (c).....	7,852	2,096,735	1,982,062	2,576,011	461,740	17,024
<i>To Foreign Countries—</i>						
Ores (d).....	20	10,972	10,505	15,994	.....	.....
Concentrates.....	1,450	435,228	371,655	660,307	128,849	8,146
<i>Total Shipments—</i>						
Total ore and concentrates.....	9,931	3,484,815	3,248,609	4,530,808	826,043	25,170

(a) Gross value means value of the metals paid for before deducting transportation and treatment charges, and includes exchange premium received.

(b) Net value is actual amount received by operator.

(c) Includes a quantity of residues shipped to foreign smelters.

(d) From North Western Ontario.

Table 237.—Employees, Salaries and Wages in the Silver-Cobalt Mining Industry in Canada, 1921 and 1922

	1921		1922	
	Number	Salaries and wages	Number	Salaries and wages
		\$		\$
SALARIED EMPLOYEES—				
Superintendents and managers.....	39	140,115	30	107,123
Technical employees.....	38	72,363	41	92,506
Clerks and stenographers.....	26	44,553	32	42,528
Total.....	103	257,031	103	242,157
WAGE-EARNERS—				
Mine.....	846	1,082,836	974	1,290,579
Mill.....	275	399,839	326	
Total.....	1,121	1,482,675	1,300	1,290,579
Grand Total.....	1,224	1,739,706	1,403	1,532,736

Table 238.—Number of Wage-earners in the Silver-Cobalt Mining Industry in Canada by Months, 1922

Month	Mine		Mill	Total
	Surface	Under-ground		
January.....	236	572	277	1,085
February.....	249	547	258	1,054
March.....	290	573	266	1,129
April.....	298	581	272	1,151
May.....	327	620	331	1,278
June.....	327	624	352	1,303
July.....	321	609	358	1,288
August.....	319	616	366	1,301
September.....	323	610	358	1,291
October.....	338	551	342	1,231
November.....	341	547	315	1,203
December.....	306	588	309	1,203
Average.....	342	632	326	1,300

Table 239.—Miscellaneous Expenses in the Silver-Cobalt Mining Industry in Canada, 1921 and 1922

	1921	1922
	\$	\$
Producing mines.....	1,784,694	2,207,743
Operating but non-producing.....	14,764	63,443
Total.....	1,799,458	2,271,186

THE SILVER-LEAD-ZINC MINING INDUSTRY

With lively markets for both lead and zinc and greatly increased prices for these metals prevailing throughout the year 1922, the silver-lead-zinc section of the Canadian mining industry showed large increases both in number of mines operated and in the quantity of ores raised and shipped. The greatest activity was observed in the Kootenays section of British Columbia, where Canada's most important lead-zinc mines are situated. The Yukon Territory was represented by two mines, both in the Mayo District, while Ontario again had one active shipping property. During the period under review, the lead-zinc mines of Quebec were idle and no shipments were made.

In Canada, there were 91 active mines, all but 3 of which as above noted, were situated in the province of British Columbia. Apart from the rise in the prices of lead and zinc and active markets both in the United States and the Orient, mining in the Nelson and Slocan districts was stimulated by the announcement that the Trail smelter would pay for the zinc in the silver-zinc ores and concentrates at a better rate than the United States smelter works with a consequent advantage to Canadian producers of ten dollars (\$10.00) to twenty dollars (\$20.00) per ton. The lead-zinc mines of the Consolidated Mining and Smelting Company, including the Sullivan, Molly Gibson, Highland and Number One shipped about 360,000 tons during the year. Other important shippers were the Silversmith, Alamo, Florence, Standard, Rambler and Bosun. Another feature of the mining development occurring during 1922 was the commencement of a large concentrating plant at Kimberley, British Columbia, designed to treat from 1,500 to 2,500 tons per day of the complex lead-zinc ores from the Sullivan Mine. Shipping the Sullivan ores to Trail has always entailed heavy transportation costs, and the increased production of ores from the mines in the Rossland District, it is expected, will provide sufficient material to keep the present concentrator in operation at Trail.

A comparison between the amounts of capital actually employed in the silver-lead-zinc industry in 1921 and 1922 does not show such an advance as might be expected by the increased number of mines operating. Many small mines made shipments in 1922, and in many cases as the claim itself was crown granted no value was given for the land. Data relating to the capital

employed in Trail smelters in British Columbia and the Kingdon Mining, Smelting and Manufacturing Company at Galetta, Ontario, which are given in the section on metallurgical works, have been excluded from the tables for the silver-lead mining industry. One or two companies operating in 1921 were idle during 1922. The capital employed in 1922 was \$6,828,980 of which \$5,318,864 was invested in producing mines and \$1,510,116 in the operating but non-producing properties. The major portion of capital was invested in British Columbia properties.

Of the 91 mines operating in 1922 in Canada, 75 made shipments, an increase over the previous year of 18 in the number of shipping mines and one in the operating but non-shipping group. The quantity of ores mined increased from 390,073 tons in 1921 to 505,773 tons in 1922 and the amount milled was also greater rising from 60,100 tons in 1921 to 90,282 tons in the year under review. The concentrates produced totalled 11,571 tons in 1922 as against 3,694 tons in 1921.

The total mine shipments increased from 312,758 tons in 1921 to 383,397 tons in 1922 with a corresponding increase in the metal contents of the ores, detailed figures of which are given in tables.

Previous to 1915 most of the lead ores mined in British Columbia were smelted and refined at Trail, B.C. From 1915 to date, with the exception of 1917, considerable tonnages of lead ores and concentrates were exported to the United States. In 1918 these exports amounted to over 27,000 tons of ores and concentrates, mostly from the Sullivan mine at Kimberley, while in 1919 they were reported as being about 7,500 tons and in 1920 as about 6,000 tons. During 1921 the exports of ores and concentrates dropped to 4,436 tons, which figure included small quantities of zinc ores and in 1922 they totalled 5,331 tons, none of which was zinc ore. In 1921, 12 mines shipped ores to the United States but in 1922 only 5 mines reported such consignments.

According to a report by the Gold Commissioner of the Yukon Territory, the year's operations in the silver-lead areas east of Dawson were of considerable importance; a section of this report as supplied by the Mining Lands and Yukon Branch of the Department of Interior reads as follows:—

"The confidence expressed in last year's report on the future development of silver-lead mining on Keno Hill and vicinity in the Upper Stewart District is amply borne out by the past year's operations.

"The development on the Keno Hill, Limited, property, has been satisfactory. The company has mined and hauled to Mayo for shipment on the opening of navigation approximately 4,300 tons of high grade ore, and in addition has blocked out ore for another year's operations on a larger scale. Prospecting on the 'Friendship' and 'Sadie' claims owned by this company has opened up bodies of high grade ore. Eighty-five men were employed by the company in these operations.

"The properties purchased by Mr. F. W. Bradley, known as the Wernecke Group, have been taken over by the Treadwell Yukon Company, Limited, organized for that purpose. Development work on these properties has been vigorously prosecuted throughout the year, the results exceeding all expectations. The plans formulated by the company in September last contemplated mining and shipping 2,000 tons of ore during the present winter. Such large high grade ore bodies, however, were developed during the winter that the company was able to mine and haul to Mayo approximately 4,500 tons of ore, in addition to which large quantities of shipping ore was mined that on account of lack of transportation it has not been possible to haul to Mayo.

"This company has revolutionized winter transportation in this country by the introduction of tractors. One ten-ton Holt tractor has hauled 4,500 tons of ore forty-five miles and as a back haul carried wood for use in and about the mine. As much as 80 tons of ore has been hauled to Mayo in one load. While exact figures are not available, it is assumed that ore may be hauled by tractors for 25 per cent of the cost of hauling with horses. Tractors will be used exclusively for hauling ore in the future.

"The two companies referred to are the only large shippers of ore, but high grade ore has been developed on a number of other properties, and shipments averaging from 25 to 100 tons hauled to the landing of Mayo for shipment.

"In general, it may be said that the development during the year has been entirely satisfactory. The plans now being made for next year contemplate the mining and hauling to Mayo of approximately 15,000 tons of high grade ore, and it is confidently expected by the operators

that in the extraction of these ores sufficient milling ore will be developed to warrant the installation of a mill."

Table 240.—Capital Employed in the Silver-Lead-Zinc Mining Industry in Canada, 1921 and 1922

Capital employed as represented by	1921				1922		
	Quebec	British Columbia	Yukon	Canada	British Columbia	Yukon	Canada
	\$	\$	\$	\$	\$	\$	\$
Cost of lands, buildings and equipment.....	2,362,450	6,890,844	159,000	9,412,294	5,225,858	774,541	6,000,399
Cost of supplies and stock on hand.....	35,000	192,008	175,000	402,008	94,923	87,143	182,066
Cash, trading and operating accounts and bills receivable.....	5,000	69,119	.....	74,119	424,131	222,384	646,515
Total.....	2,402,450	7,151,971	334,000	9,888,421	5,744,912	1,084,064	6,828,980

Table 241.—Ore Mined and Milled in the Silver-Lead-Zinc Mining Industry, 1921 and 1922

Province	Ore Mined	Ore milled	Concentrates produced	Ore mined	Ore milled	Concentrates produced
	tons	tons	tons	tons	tons	tons
Quebec and Ontario.....	50,557	50,557	†2,315	36,138	36,138	1,455
*British Columbia.....	337,406	9,543	1,379	464,084	54,144	10,116
Yukon Territory.....	2,110	.....	.....	5,551	.....	.....
Total for Canada.....	390,073	60,100	3,694	505,773	90,282	11,571

*Does not include concentrator operated by Consolidated Mining and Smelting Company of Canada at Trail.

†Lead concentrates only.

Table 242.—Products Shipped by Silver-Lead-Zinc Mines in Canada, 1921 and 1922

Location of Mines	No. of Mines Shipping	Product shipped	Quantity shipped	Net value at shipping point	Total metal contents as determined by settlement assay			
					Gold	Silver	Lead	Zinc
			tons	\$	ozs.	ozs.	lb.	lb.
1921								
Quebec, Ontario and Yukon.	3	Lead ore.....	2,110	94,000	.....	378,261	2,472,615	.....
		Lead concentrates.....	2,315	132,500	376	37,895	3,422,090	.....
		Total.....	4,425	226,500	376	415,156	5,894,705	.....
British Columbia....	54	†Lead ore.....	9,415	371,177	1,073	540,493	2,139,709	286,374
		*Lead concentrates.....	1,419	73,636	2	32,725	1,483,202	6,980
		Zinc ore.....	297,241	1,486,597	.....	839,624	58,476,369	98,675,414
		Zinc concentrates.....	165	12,119	8	17,218	20,482	123,679
		Dry ore.....	93	7,024	17	11,213	3,239	.....
		Total.....	308,333	1,950,553	1,100	1,441,273	62,123,001	99,092,447
Total for Canada...	57		312,758	2,177,053	1,476	1,857,429	63,017,706	99,092,447
1922								
Ontario and Yukon..	3	Lead ore.....	4,150	471,522	.....	951,932	4,419,744	277,054
		Lead concentrates.....	2,425	145,500	.....	.....	2,910,610	.....
		Total.....	6,535	617,022	.....	951,932	7,330,354	277,054
British Columbia....	72	Lead ore.....	14,194	562,183	70	599,862	7,552,793	1,233,901
		Lead concentrates.....	6,423	624,370	234	611,843	6,452,703	.....
		Zinc ore.....	350,504	2,075,144	16	1,312,505	78,303,030	98,057,915
		Zinc concentrates.....	5,592	282,705	26	186,584	47,281	4,918,049
		Dry ore.....	98	12,388	8	19,922	4,264	.....
		Total.....	376,811	3,556,790	354	2,730,716	92,360,071	104,209,865
Total for Canada...	75		383,397	4,173,812	354	3,682,648	99,696,425	104,486,919

†Includes 5,506 tons of silver ore (Dolly Varden Mine).

*Includes 44 tons of silver concentrates.

Table 243.—Destination of Shipments from Silver-Lead-Zinc Mines in Canada, 1921 and 1922

Product shipped	Tons shipped	Net value at shipping point	Total Metal Contents as determined by Settlement Assay			
			Gold	Silver	Lead	Zinc
		\$	ozs.	ozs.	lb.	lb.
1921						
<i>To Canadian Smelters—</i>						
Lead ore.....	8,641	295,530	1,063.0	433,364	1,595,278	282,294
Lead concentrates.....	2,349	113,241	1.6	28,189	3,397,895	.....
Zinc ore.....	297,211	1,486,134	0.3	838,759	58,476,369	98,652,785
Zinc concentrates.....	28	1,952	8.0	3,875	4,634	11,167
Dry ore.....	93	7,024	16.8	11,213	3,239	.....
Total.....	308,322	1,903,881	1,089.7	1,315,400	63,477,415	98,916,246
<i>To United States Smelters—</i>						
Lead ore.....	2,884	169,647	9.9	485,390	3,017,046	4,080
Lead concentrates.....	1,385	92,895	376.2	42,431	1,507,397	6,980
Zinc ore.....	30	463	.....	865	.....	22,629
Zinc concentrates.....	137	10,167	.....	13,343	15,848	112,512
Dry ore.....	.....	.....	.....	.....	.....	.....
Total.....	4,436	273,172	386.1	542,029	4,540,291	146,201
1922						
<i>To Canadian Smelters—</i>						
Lead ore.....	13,642	500,302	52	537,313	6,820,558	1,233,901
Lead concentrates.....	8,230	704,950	218	544,331	8,598,526	.....
Zinc ore.....	350,504	2,075,144	16	1,312,505	78,303,030	98,057,915
Zinc concentrates.....	5,592	282,705	26	186,584	47,281	4,918,049
Dry ore.....	98	12,388	8	19,922	4,264	.....
Total.....	378,066	3,575,519	320	2,600,655	93,773,659	104,299,865
<i>To United States Smelters—</i>						
Lead ore.....	4,713	533,403	18	1,014,481	5,151,979	277,054
Lead concentrates.....	618	64,890	16	67,512	764,787	.....
Total.....	5,331	598,293	34	1,081,993	5,916,766	277,054

Table 244.—Shipments of Lead Ores from Canadian Mines, 1913-1922

Year	Lead ores shipped		Lead Contents in Pounds	Silver Contents in Ounces
	Tons	Value \$		
1913.....	85,978	3,276,812	53,807,570	2,564,155
1914.....	70,207	2,652,802	50,527,130	2,501,820
1915.....	73,752	2,958,394	48,708,005	2,954,175
1916.....	84,516	4,568,500	54,124,628	2,582,952
1917.....	46,799	3,866,862	38,696,116	1,670,064
1918.....	75,256	4,705,573	46,843,602	2,314,542
1919.....	54,508	3,044,839	32,147,989	2,185,376
1920.....	69,493	2,985,848	36,325,507	2,882,178
1921.....	15,259	671,313	9,517,616	989,374
1922.....	27,203	1,803,575	21,335,850	2,163,637

Table 245.—Shipments of Zinc Ores from Canadian Mines, 1898-1922

Year	Zinc ore shipped		Metallic zinc in ore shipped	Year	Zinc ore shipped		Metallic zinc in ore shipped
	Tons	Value	Pounds		Tons	Value	Pounds
		\$				\$	
1898.....	1,162	11,000	788,000	1910.....	5,063	120,003	4,361,712
1899.....	865	18,165	814,000	1911.....	2,590	101,072	2,346,849
1900.....	261	4,810	212,000	1912.....	6,415	215,149	5,354,700
1901*				1913.....	7,889	186,827	7,069,800
1902.....	158	1,659	142,200	1914.....	10,893	262,563	9,101,460
1903.....	1,000	10,500	900,000	1915.....	14,895	554,938	12,231,439
1904.....	597	3,700	477,568	1916.....	82,077	1,086,249	48,498,078
1905*	9,413	139,200	*	1917.....	116,489	1,323,985	64,655,713
1906*	1,154	23,800	*	1918.....	121,200	1,228,195	63,026,464
1907*	1,573	49,100	*	1919.....	135,535	1,049,493	59,959,709
1908*	452	3,215	*	1920.....	249,136	1,157,844	91,033,202
1909†	18,371	242,699	16,468,204	1921.....	297,406	1,498,716	98,799,063
				1922.....	356,096	2,357,849	102,975,964

*Figures not available. †Includes 7,424 tons shipped late in 1908.

Table 246.—Employees, Salaries and Wages in the Silver-Lead-Zinc Mining Industry in Canada, 1921 and 1922

Class	1921				1922			
	British Columbia		Canada*		British Columbia		Canada	
	Number	Salaries and Wages	Number	Salaries and Wages	Number	Salaries and Wages	Number	Salaries and Wages
		\$		\$		\$		\$
SALARIED EMPLOYEES—								
Superintendents and managers..	23	43,363	31	71,425	19	52,977	24	77,177
Technical employees.....	12	21,201	15	25,886	11	26,575	17	37,318
Clerks and stenographers.....	14	15,625	25	26,235	16	17,484	23	29,399
Total.....	49	85,189	71	123,546	46	97,036	64	143,894
WAGE-EARNERS—								
Surface and mill.....	202	657,217	258	841,025	359	880,019	432	1,226,751
Underground.....	314		432		380		498	
Total.....	516	657,217	690	841,025	739	880,019	930	1,226,751
Grand Total.....	565	742,406	761	964,571	785	977,055	994	1,370,645

*Totals for Canada include data for three other mines—1 in Quebec, 1 in Ontario and 1 in the Yukon.

Table 247.—Number of Wage-earners in the Silver-Lead-Zinc Mining Industry in Canada, by Months, 1922

Month	Surface	Underground	Total
January.....	284	440	724
February.....	285	439	724
March.....	266	426	692
April.....	274	421	695
May.....	352	418	770
June.....	406	446	852
July.....	462	476	938
August.....	483	451	934
September.....	435	521	956
October.....	454	490	944
November.....	478	538	1,016
December.....	441	523	964
Average.....	432	498	930

Table 248.—Miscellaneous Expenses in the Silver-Lead-Zinc Mining Industry in Canada, 1921 and 1922

Province	1921	1922
	\$	\$
Quebec, Ontario and Yukon.....	39,212	131,862
British Columbia.....	409,867	1,018,733
Canada.....	449,079	1,150,595

METALLURGICAL WORKS

It was found impossible in several instances to draw any line of demarcation between mining proper and those operations which were carried on above ground by those establishments that give treatment of one kind or another to the crude ore after it is mined, since it has been the custom to consider this preparation for market or for further treatment, as part of the mining operations.

In a number of instances, however, it has been possible to obtain certain statistics regarding smelting and refining plants operated in conjunction with mines, and the present section has been designed to present in a correlated manner the principal data furnished by these concerns and by similar plants operated independently of mines, in which the reduction of ores either by fire or by electricity was carried on for the production of the non-ferrous metals or compounds of them.

The operations carried on by the metallurgical works closely reflected the conditions in those sections of the mining industry most dependent on these plants. In British Columbia, while the lead and zinc departments were active and produced to capacity, the copper smelters greatly reduced their operations. In Ontario the nickel-copper industry was almost at a standstill, and did not show any marked recovery until the early fall months. The three smelters in Ontario treating the ores from the Cobalt district curtailed their activities and one company passed out of existence during the period. The lead smelter at Galetta, Ontario, continued to produce to capacity, with an output around three million pounds of lead per annum. Offsetting the general decline, however, was the favourable development and operation of the large silver and gold mills of northern Ontario throughout the entire year 1922 but, while the recovery operations carried on there are metallurgical in character, they have not been included in this section for the reasons already mentioned, and the decline in the record for 1922 as compared with that of 1921, as shown in the following tables, is as a consequence more pronounced. The names of the companies and their principal products follow:—

BRITISH COLUMBIA

The Consolidated Mining and Smelting Company of Canada, Ltd., Trail, B.C., operating many mines in addition to a large smelter and refineries producing gold, silver, lead, copper, copper sulphate, and zinc.

The Granby Consolidated Mining, Smelting and Power Company, Ltd., Anyox, B.C., operating mines and a copper smelter and producing copper, gold and silver.

ONTARIO

The International Nickel Company of Canada, Ltd., Copper Cliff, Ont., operating several mines and a smelter near Copper Cliff, and a refinery for matte at Port Colborne, Ontario, producing nickel and compounds of nickel, copper, monel metal and small amounts of the precious metals such as gold, silver, platinum and others of the platinum group;

The Mond Nickel Company, operating mines and a smelter at Coniston, Ontario, but shipping the smelter matte to Wales for refining;

The British America Nickel Corporation, operating mines and a smelter near Sudbury, and refining the matte at Deschenes, Que., producing nickel and nickel compounds, copper and some precious metals;

The Coniagas Reduction Company, operating a smelter in St. Catharines, Ontario, and producing silver bullion, the metals and oxides of cobalt and nickel, metallic arsenic, white arsenic and copper sulphate;

The Deloro Smelting and Refining Company, operating at Deloro, Ontario, smelting cobalt ores and producing silver bullion, metals and oxides of cobalt and nickel, white arsenic, the alloy "stellite" and insecticides.

The Kingdon Mining, Smelting and Manufacturing Company, Galetta, Ont., producing a pig lead from galena ores;

The Canadian Zinc Products Company operated their zinc oxide plant for a short time during 1921, but it was partially destroyed by fire in August of that year, and did not re-open throughout the entire period of 1922.

NEW BRUNSWICK

The North American Antimony Smelting Company, Lake George, producing antimony regulus (idle). The company has been reorganized and is now known as the Antimony Products Corporation.

Smelting and reduction works treating only foreign ores, such as the Electro Tin Syndicate, Brantford, Ontario (idle in 1922); the Shawinigan Electro Metals Co., Shawinigan Falls, P.Q. (idle in 1922), and the Northern Aluminium Co., Shawinigan Falls, P.Q., and all furnaces used in recovering the non-ferrous metals from scrap have been excluded, as their activities have been reviewed in the report on the "Manufactures of the Non-Ferrous Metals."

As it is not permitted to publish statistics relating to an industry unless it is represented by three or more companies, it was necessary in some cases to include in one class, plants of different kinds, for instance, copper smelters and refineries with lead and zinc plants.

The groups selected were: The nickel-copper smelting and refining group, comprising three companies which operated three smelting establishments, all in Ontario, and two refineries, one of which was in Ontario and the other in Quebec; the silver-cobalt smelters and refineries, including two companies engaged in treating silver ores from the Cobalt camp; and the copper-lead-zinc smelters and refineries in which three companies were active, two being in British Columbia and one in Ontario.

It may be pointed out that the tables showing capital employed will in part duplicate information already given in the mining section, since there was no known basis on which the amounts to be allocated to mining or to metallurgy could be calculated. The data given on nickel-copper smelting and refining, which have already been included in the mining section, are here given separately. Apart from the points just mentioned, the data following relate to the metallurgical industry only.

In the table for "Capital Employed" in the metallurgical works in Canada, the data given show a decline of almost 20 million dollars from the previous year, but the bulk of this decrease occurred in the value of materials on hand, etc., and in working capital.

Table 249.—Capital Actually Employed in the Metallurgical Plants of Canada, 1921 and 1922

	1921				1922			
	Lands, buildings, plant, machinery and tools	Materials on hand, supplies finished products ore on dump	Cash, trading, and operating accounts bills receivable	Total	Lands, buildings, plant, machinery and tools	Materials on hand, supplies finished products ore on dump	Cash trading and operating accounts bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Nickel-copper smelters and refineries.....	22,303,585	10,467,385	4,062,590	36,833,560	23,242,522	3,736,357	1,161,035	28,129,914
Silver-cobalt smelters.....	1,433,442	2,105,786	444,096	3,983,324	1,415,656	227,042	1,125,225	2,767,923
Copper, lead and zinc smelters and refineries.....	31,823,524	9,234,445	812,092	41,870,061	24,273,706	7,094,677	894,331	32,262,714
Total.....	55,560,551	21,807,616	5,318,778	82,686,945	48,931,884	11,058,076	3,170,591	63,160,551

In Table 251 the average price for the year 1921 in a recognized market was used in computing the values except in the case of nickel-copper matte for which as it was impossible to secure figures from the operators, a value of 10 cents per pound on the copper content and of 25 cents per pound on the nickel content was used. For the year 1922 the values represent more nearly the actual amounts which might have been received had the entire production been sold. These figures were arrived at by finding the selling value from the sales made and reported.

The total quantities and values given will not agree with those shown in Part One as the mineral production of Canada since a portion of the metal produced in the smelters was derived from foreign ores treated in Canada, and large amounts of gold and silver, recovered in mining and milling operations, did not pass through the plants described in this section.

It will be observed that the total value given in the table showing products made, is not the net value to the metallurgical companies and therefore cannot be used as a value to be included with the manufacturing industry of Canada. In order to secure such figures it would be necessary to deduct the costs of raw materials used, e.g., ore, concentrates and residues, or in other words the values accruing to the mining and milling industry of these raw materials treated during the period.

Table 250.—Ores, Concentrates, etc., Treated in Canadian Smelters, 1921 and 1922

Group	1921	1922
Nickel-Copper—	Tons	Tons
Ores treated.....	393,768	314,120
Matte produced.....	19,497	17,324
Matte exported for refining.....	10,465	29,108
Matte treated in Canadian refineries.....	5,558	10,340
Silver-Cobalt-Nickel—		
Ores treated.....	141	252
Concentrates treated.....	2,005	1,556
Residues treated.....	2,994	2,068
Copper, Lead and Zinc—		
Copper, ores and concentrates.....	1,016,302	895,691
Lead ores.....	8,403	15,283
Lead concentrates.....	48,013	63,119
Gold ores.....	7,380	10,507
Zinc residues.....	32,019	44,948
Other ores.....	381	569
Zinc concentrates.....	106,239	109,942

Table 251.—Products made by the Metallurgical Industry in Canada, 1921 and 1922

Item	Unit	1921		1922	
		Quantity	Value	Quantity	Value
White arsenic.....	Pounds	3,509,921	\$ 310,627	3,335,613	\$ 243,500
Cobalt.....	"	22,216	60,648	106,274	275,250
Cobalt oxide.....	"	216,875	464,119	360,495	720,990
Mixed oxides.....	"	105,675	113,865	85,730	69,384
Copper blister.....	"	†36,051,554	4,506,444	†33,668,122	4,608,507
Copper refined.....	"			730,000	112,069
Copper sulphate.....	"	548,481	30,166	208,282	11,455
Gold.....	Fine ozs.	64,879	1,341,168	19,153	395,892
Iridium, osmium, rhodium, ruthenium.....	"	56	9,520	21	1,680
Lead.....	Pounds	62,333,281	3,579,177	81,412,716	3,917,787
Matte*—nickel-copper and silver-copper.....	Tons	14,336	3,902,091	**19,841	3,719,553
Nickel.....	Pounds	5,458,659	1,835,737	11,084,262	3,146,036
Nickel castings.....	"	14,522	5,896		
Nickel oxide.....	"	7,879,055	1,595,508	2,505,181	409,156
Nickel sulphate.....	"	3,139	204	27,270	2,231
Palladium.....	Fine ozs.	591	38,415	341	22,165
Platinum.....	"	269	20,175	116	17,177
Silver.....	"	5,415,128	3,392,794	3,844,485	2,595,835
Zinc.....	Pounds	52,988,000	2,466,591	56,290,000	3,217,536
Residues.....	"	294,497	53,139	920,600	151,002
Total.....			23,732,277		23,637,205

*Exported or not refined.

†Total copper contents of blister converter and refined copper.

‡Includes 1,124,777 oz. silver and 31,894 oz. gold.

**Mattes containing 27,829,941 lbs. nickel, 19,868,639 lbs. copper and 59,718 oz. silver.

From the statements of mine operators showing net values received for all ores and concentrates, etc., shipped during the period, it was possible to make a fairly close estimate of the cost to the smelters. For ores, etc., treated by the silver-cobalt smelters an approximate average value per ton was easily found, and with the exception of the nickel-copper no difficulty for any ore was met with. As it was impossible to secure good figures for nickel-copper ore, a nominal value of \$6.00 per ton was used. Where residues passed through various plants from one process to another as at Trail, British Columbia, it was impossible to arrive at close figures, and as the total residues amounted to but a fraction of the commodities treated, they were left out of the compilation. Other residues have had values applied to them, based on their mineral content, where known, or from figures showing receipts from sales.

A tabulation showing approximately the total expenses incurred during 1921 and 1922 follows.

Table 252.—Summary of Expenditures in Metallurgical Works in Canada, 1921 and 1922

	1921	1922
	\$	\$
Estimated cost of ores, etc. treated, in silver-cobalt smelters.....	2,150,000	1,070,000
Estimated cost of ores, etc., treated, in nickel-copper smelters.....	2,350,000	1,889,000
Estimated cost of ores etc., treated, in copper, lead and zinc smelters.....	3,900,000	4,213,000
Total salaries and wages.....	4,406,957	5,056,464
Cost of chemicals used.....	254,627	*200,000
Cost of fuel.....	3,097,514	1,031,572
Miscellaneous expenses.....	6,441,846	8,229,941
Total expenditures.....	22,600,944	21,689,977

*Estimated—Data not collected in 1922.

Table 253.—Employees, Salaries and Wages in the Metallurgical Works in Canada, 1921 and 1922

Group	1921				1922			
	On Smelter Pay-roll		On Refinery Pay-roll		On Smelter Pay-roll		On Refinery Pay-roll	
	No. of Employees	Salaries and Wages	No. of Employees	Salaries and Wages	No. of Employees	Salaries and Wages	No. of Employees	Salaries and Wages
		\$		\$		\$		\$
Nickel-Copper Smelters and Refineries—								
Salaried employees.....	78	242,790	78	150,816	62	170,223	81	142,390
Wage-earners.....	1,073	953,582	462	401,541	605	799,831	462	676,523
Silver-Cobalt-Nickel Smelters and Refineries Combined—								
Salaried employees.....	47	111,115			45	95,317		
Wage-earners.....	231	325,466			220	187,193		
Copper-Lead-Zinc Smelters and Refineries—								
Salaried employees.....	93	191,830	19	41,106	176	40,137		
Wage-earners.....	1,217	1,988,711			1,733	2,570,173		
All the Metallurgical Works—								
Superintendents.....	37	165,307	16	62,913	55	247,287	6	44,100
Technical employees: engineers, chemists, draughtsmen, etc.....	47	106,797	41	94,718	104	215,110	17	22,029
Clerks, stenographers, etc.....	134	273,631	40	34,291	124	204,280	58	76,261
Total—Salaried employees	218	545,735	97	191,922	283	666,677	81	142,390
Wage-earners.....	2,521	3,267,759	462	401,541	2,558	3,557,197	462	676,523
Grand total.....	2,739	3,813,494	559	593,463	2,841	4,223,874	543	818,913

Table 254.—Number of Wage-earners in the Metallurgical Works in Canada, by Months, 1922

Month	Nickel-Copper Smelters and Refineries	Silver-Cobalt Nickel Smelters and Refineries	Copper-Lead Zinc Smelters and Refineries	Total
January.....	1,282	155	1,606	3,043
February.....	1,395	126	1,652	3,173
March.....	1,437	116	1,787	3,340
April.....	472	128	1,725	2,325
May.....	648	150	1,742	2,540
June.....	767	189	1,710	2,666
July.....	918	183	1,725	2,826
August.....	1,005	208	1,755	2,968
September.....	1,207	255	1,765	3,227
October.....	1,182	262	1,728	3,172
November.....	1,245	288	1,745	3,278
December.....	1,262	283	1,756	3,301
Average.....	1,067	220	1,733	3,020
Average in 1921.....	1,535	231	1,217	2,983

Table 255.—Miscellaneous Expenses Chargeable to Smelting and Refining Operations in Canada, 1921 and 1922

	Nickel-Copper Smelters and Refineries	Silver-Cobalt Smelters and Refineries	Copper, Lead and Zinc Smelters and Refineries	Total
	\$	\$	\$	\$
Cost of purchased power.....	142,633	24,786	490,758	658,177
Cost of general supplies.....	589,316	103,845	3,239,240	3,932,401
Royalties.....	57,179	1,287	80,268	138,734
Taxes.....	127,621	13,216	28,798	169,635
Municipal.....	2,477		103,112	105,589
Provincial.....	42,243		30,046	72,289
Dominion.....	768,526	60,352	536,143	1,365,021
All other sundry expenses.....				
Total for 1921.....	1,759,995	203,486	4,508,365	6,441,846
Total for 1922.....	4,015,618	165,189	4,049,134	8,229,941

NON-METALLIC MINERAL INDUSTRIES

ASBESTOS

The eastern townships area in the Province of Quebec furnishes about 90 per cent of the world's production of asbestos. Rhodesia, the second producer, markets only the longer fibre stocks, and is therefore an important competitor, as Canadian mines ship both long and short fibre. The Union of South Africa and Russia have also become more important sources of supply, particularly to European markets; several other countries annually produce asbestos, but in less amounts.

Asbestos, owing to its fibrous structure and to the fact that it will not burn, finds many uses as a fire-proofing material, particularly in felts, sheets, theatre drop-curtains, mitts, etc., and also as a principal component of roofings, shingles, pipe-coverings, brake linings and wall board, to mention only a few of the better-known uses.

The industry in Canada was represented in 1922 by 12 firms operating 15 mines at which there were mills for the grading of the product. In the 1921 issue of this report, there was a description of the method used in grading asbestos in the Quebec mills.

The amount of capital employed, comprising the value of lands, buildings, plant equipment, cost of materials and supplies on hand at the end of the year, and working capital including cash balances and bills receivable was \$43,997,252, an increase of 206 million dollars over the total reported for the preceding year.

Employment was furnished to 2,572 persons including 154 salaried employees and the total disbursements in salaries and wages amounted in all to \$2,581,644. The trend of employment was upward throughout the greater part of the year, rising from 1,552 wage-earners in January to a peak of 2,782 in August. There was a slight falling-off in the number employed in October and November and the year closed with 2,614 men on the rolls.

The extreme depression in the market for asbestos noted in 1921, extended into the first quarter of 1922, but beginning in April and continuing throughout the rest of the year, there was a better demand for this commodity although prices declined still further. The selling value for Crude No. 1 which was \$2,750 per ton in December, 1920, averaged \$2,065 in 1921 and \$867 in 1922.

United States asbestos operators who reported a 50 per cent decline in production in 1921 produced only a very small amount in 1922. South Africa showed a considerable falling-off from the 1921 record although there was a slight recovery towards the end of the year.

In checking over the list of operating firms it will be noted that three companies, namely, the General Asbestos Company; Windsor Asbestos Company, Limited; and the Canada Asbestos and Chrome Company which operated in 1921 were inactive during the period under review.

Table 256.—Principal Statistics of the Asbestos Industry in Canada, 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		\$		\$	\$	\$	\$
1920.....	17	21,839,090	3,776	4,765,305	395,976	5,420,559	14,792,201
1921.....	15	41,357,161	2,694	2,657,425	318,633	2,713,440	4,906,230
1922.....	12	43,997,252	2,572	2,581,644	265,962	2,704,462	5,552,723

Table 257.—Capital Employed in the Asbestos Industry in Canada, 1921 and 1922

Capital Employed as represented by	1921	1922
	\$	\$
Cost of lands, buildings, plant machinery and tools.....	35,348,977	37,291,835
Cost of supplies and stock on hand.....	4,299,792	2,717,312
Cash, trading and operating accounts and bills receivable.....	1,708,392	3,988,105
Total.....	41,357,161	43,997,252

Table 258.—Employees, Salaries and Wages in the Asbestos Industry in Canada, 1921 and 1922

	1921				1922			
	Number			Salaries and Wages	Number			Salaries and Wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
SALARIED EMPLOYEES:—								
Salaried officers of corporation.....					22	1	23	157,840
Superintendents and managers.....	27		27	106,960	27		27	87,832
Technical employees, engineers, etc.....	32		32	60,391	21		21	42,739
Clerks and stenographers.....	60	5	65	90,668	69	14	83	105,494
Total.....	119	5	124	258,019	139	15	154	393,905
WAGE-EARNERS:—								
Mine.....	1,684		1,684	1,598,734	1,613		1,613	1,537,805
Mill.....	886		886	800,672	805		805	649,934
Total.....	2,570		2,570	2,399,406	2,418		2,418	2,187,739
Grand Total.....	2,689	5	2,694	2,657,425	2,557	15	2,572	2,581,644

Table 259.—Number of Wage-earners in the Asbestos Industry in Canada by Months, 1922

Month	Number		Month	Number	
	Mine	Mill		Mine	Mill
January.....	1,023	529	July.....	1,821	847
February.....	1,076	547	August.....	1,935	852
March.....	1,193	596	September.....	1,890	871
April.....	1,141	582	October.....	1,681	834
May.....	1,345	714	November.....	1,663	852
June.....	1,569	807	December.....	1,758	856
Average for 1921.....					2,570
Average for 1922.....					2,418

Table 260.—Miscellaneous Expenses in the Asbestos Industry in Canada, 1921 and 1922

	1921	1922
	\$	\$
Cost of purchased power for mine and mill use.....	419,056	Individual
Cost of all materials and supplies used in the mine or mill.....	1,120,462	items
Royalties paid.....	165,462	not available
Taxes—		
Municipal.....	58,515	
Provincial.....	12,134	
Federal.....	170,002	
All other sundry expenses.....	761,809	
Total.....	2,713,440	2,704,462

Table 261.—Monthly Average Prices of Asbestos by Grades, 1922

(Price per short ton)

(Computed from quotations in the Engineering Mining Journal-Press)

Month	Crude No. 1	Crude No. 2	Spinning Fibres	Magnesia and Compressed Sheet Fibres	Shingle Stock	Paper Stock	Cement Stock	Floats Stock	Long Spinning Fibre*
	\$	\$	\$	\$	\$	\$	\$	\$	\$
January.....	1,250	725	312	200	115	55	20	8	.....
February.....	1,100	625	250	155	105	50	15	9	.....
March.....	900	625	250	137	95	45	15	8	.....
April.....	900	625	250	137	95	45	15	8	.....
May.....	825	450	187	125	85	40	16	7	300
June.....	1,050	525	300	125	107	45	25	15	425
July.....	888	525	269	125	100	41	20	12	388
August.....	725	400	237	125	82	31	15	8	250
September.....	725	400	238	125	82	31	15	8	250
October.....	700	350	238	137	75	34	15	9	200
November.....	650	337	238	187	75	32	16	10	225
December.....	675	375	238	150	75	37	13	9	200
Average.....	867	499	252	144	98	40	17	9	292

* Prices not quoted for the first four months.

COAL

Canada's coal reserves are estimated to constitute more than 16 per cent of the world's known available supply and most of these deposits are located in the western provinces although coal of good quality has been mined in the maritime provinces for a great many years, and it is probable that operations in that field will be continued for many years to come.

In 1922, there were 506 coal mines operated in Canada, of which 357 were in Alberta, 59 in Saskatchewan, 57 in Nova Scotia, 19 in New Brunswick, 13 in British Columbia, and 1 in the Yukon.

The total capital employed by these mines amounted to \$140,466,108, of which 59.1 million dollars was invested in Nova Scotia mines; 47.2 million dollars in Alberta mines and 29.2 million dollars in British Columbia properties.

Salaried employees to the number of 1,742 were employed in 1922, and salaries paid amounted to \$3,777,626. There was an increase both in the number of salaried employees and in the salaries paid as compared with the previous year, the number of such employees on the rolls in 1921 being 1,626, and the amount paid in salaries, \$3,717,238.

The average number of wage-earners engaged in the coal-mining industry in Canada (exclusive of salaried employees) increased very appreciably in the first three months of the year reaching a peak of 40,682 on the rolls in March. The closure of a considerable number of mines because of the strike which commenced on April 1st resulted in the April employment figures dropping to 21,514 and the number employed remained practically unchanged until August when the average rose to 28,685. There was a continued increase in the number employed during the next three months to 35,170 in November. A slight decline was noted in December and the year closed with 34,178 men on the rolls. The average number employed throughout the year was 30,096.

By provinces, Nova Scotia was easily the leader with an average of 14,068 employees for the year and a maximum of 23,161 employed in March. Alberta coal mines furnished employment on the average to 8,815 men during the year, the maximum employment being recorded in November when 13,383 names were on the rolls. Table 264 shows the average number of employees in the coal mines of Canada by provinces for each month and Table 265 shows for 1922 the number of employees by classes and by provinces.

Closely related in point of interest to the number of employees are the data concerning the number of days' work done and the wages paid. Of the 30,096 employees, 7,714 worked on the surface and 22,382 were employed underground. The surface men worked on the average 259 days during the year as compared with 254 days in 1921 and the underground employees worked 219 days on the average or precisely the same number as in 1921. Only one more day's work was done on the average by all employees in the coal mines in 1922 than in 1921, the total for the year being 229 days. Earnings per man-day were \$5.18 as compared with \$6.20 in the previous year and the total wages paid amounted to \$35,773,001 or approximately seven million dollars less than the total of \$42,758,471 paid in 1921.

Table 262.—Capital Employed in the Coal Mines of Canada, as at December 15, 1922

Capital Employed as represented by	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia	Yukon	Canada
	\$	\$	\$	\$	\$	\$	\$
Value of buildings, plant, machinery and tools.....	52,657,170	1,092,610	2,874,545	39,912,406	25,702,375	202,500	122,441,606
Cost of supplies on hand and coal on bank.....	2,639,514	53,949	46,298	1,339,634	664,379	1,696	4,745,470
Cash, trading and operating accounts and bills receivable..	3,889,786	306,435	148,960	6,037,835	2,896,016	.....	13,279,032
Total.....	59,186,470	1,452,994	3,069,803	47,289,875	29,262,770	204,196	140,466,108

Table 263.—Salaried Employees and Salaries Paid on Coal Mine Staffs in Canada, by Provinces, 1922

	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia and Yukon	Canada
Salaried officers of the corporation.....	No. 39 Salary \$ 163,603	No. 6 Salary \$ 19,000	No. 3 Salary \$ 12,400	No. 106 Salary \$ 348,902	No. 26 Salary \$ 157,300	No. 189 Salary \$ 701,205
General superintendents and managers.....	No. 166 Salary \$ 416,728	No. 12 Salary \$ 34,365	No. 11 Salary \$ 29,295	No. 292 Salary \$ 807,768	No. 51 Salary \$ 180,455	No. 532 Salary \$ 1,468,611
Technical experts, accountants, etc.....	No. 122 Salary \$ 241,973	No. 4 Salary \$ 4,340	No. 7 Salary \$ 8,290	No. 169 Salary \$ 253,804	No. 105 Salary \$ 238,446	No. 407 Salary \$ 746,853
Clerks, stenographers and salesmen.....	No. 247 Salary \$ 304,416	No. 11 Salary \$ 15,108	No. 11 Salary \$ 16,583	No. 248 Salary \$ 340,087	No. 106 Salary \$ 184,763	No. 623 Salary \$ 860,957
Totals.....	No. 574 Salary \$ 1,126,720	No. 33 Salary \$ 72,813	No. 32 Salary \$ 66,568	No. 815 Salary \$ 1,750,561	No. 288 Salary \$ 760,964	No. 1,742 Salary \$ 3,777,626

Table 264.—Number of Employees in the Coal Mines of Canada by Months and by Provinces, 1922

Month	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia and Yukon	Canada
January.....	10,988	642	589	11,744	6,525	30,488
February.....	17,951	623	555	11,022	6,588	36,739
March.....	23,161	649	487	9,871	6,514	40,682
April.....	12,314	526	383	3,295	4,996	21,514
May.....	12,733	555	338	3,518	5,083	22,227
June.....	12,271	586	342	3,679	5,033	21,911
July.....	12,870	580	342	3,739	5,170	22,701
August.....	13,087	619	325	8,075	6,579	28,685
September.....	12,973	647	388	11,700	6,810	32,518
October.....	13,253	650	554	13,158	6,746	34,341
November.....	13,679	651	642	13,383	6,815	35,170
December.....	13,527	593	599	12,604	6,855	34,178
Average.....	1922 14,068	611	460	8,815	6,142	30,096
	1921 12,626	449	435	10,019	6,694	30,223

Table 265.—Number of Employees, in the Coal Mines of Canada, by Classes and by Provinces, 1922

Classification	Provinces					Total for Canada		
	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia and Yukon	Surface	Under-ground	Total
SURFACE—								
Administration.....	119	14	12	162	34	258	83	341
Foremen and clerks.....	198	17	14	254	146	589	40	629
Screenmen and loaders.....	730	18	19	527	184	1,389	89	1,478
UNDERGROUND—								
Officials.....	441	2	6	289	182	14	906	920
Hand cutters and helpers.....	2,061	399	251	2,324	2,068	77	7,026	7,103
Machine cutters.....	1,509	2	3	348	78	.....	1,940	1,940
Machine loaders and helpers.....	1,502	2	8	1,129	35	1	2,675	2,676
Horse haulage employees.....	839	4	42	680	392	48	1,909	1,957
Mechanical haulage employees.....	1,551	1	5	307	398	83	2,179	2,262
Ventilation employees.....	375	.....	.....	92	55	14	588	522
Roadmakers.....	295	.....	6	141	113	4	551	555
Timbermen.....	685	9	12	331	168	15	1,190	1,265
Pumpmen.....	195	2	7	58	42	9	295	304
MISCELLANEOUS—								
Enginemen.....	296	11	8	178	93	535	51	586
Firemen.....	351	4	8	163	62	542	46	588
Machinists.....	357	1	2	84	94	497	41	538
Carpenters and masons.....	166	2	6	102	112	365	23	388
Other mechanics.....	289	13	6	201	114	410	213	623
All other white employees.....	2,109	110	45	1,445	945	2,451	2,203	4,654
Japanese.....	.....	.....	.....	.....	78	8	70	78
Chinese.....	.....	.....	.....	.....	740	399	341	740
Indians.....	.....	.....	.....	.....	9	6	3	9
Total.....	14,068	611	460	8,815	6,142	7,714	22,382	30,096

Table 266.—Number of Employees, Work Done and Wages Paid in the Coal Mines of Canada, by Months, 1922

Month	Number of Employees			Days' Work Done			Total Wages Paid
	Surface	Under-ground	Total	Surface	Under-ground	Total	
January.....	7,626	22,862	30,488	160,339	399,946	560,285	Monthly Records not available
February.....	8,758	27,981	36,739	168,414	439,722	608,136	
March.....	9,110	31,572	40,682	175,912	451,864	627,776	
April.....	5,674	15,840	21,514	107,625	244,820	352,445	
May.....	6,047	16,180	22,227	121,147	256,283	377,430	
June.....	6,147	15,764	21,911	131,394	304,843	436,237	
July.....	6,389	16,312	22,701	144,027	331,649	475,676	
August.....	7,799	20,886	28,685	139,459	293,872	433,331	
September.....	8,577	23,941	32,518	214,897	507,544	722,441	
October.....	8,873	25,468	34,341	217,831	585,368	803,199	
November.....	8,801	26,369	35,170	204,579	559,604	764,183	
December.....	8,763	25,415	34,178	209,584	533,321	742,905	
Total				1,995,208	4,908,836	6,904,044	35,773,001
Average	7,714	22,382	30,096	259 days per year	219 days per year	229 days per year	5.18 per day

Table 267.—Miscellaneous Coal Mine operating expenses, by Provinces, 1921 and 1922

Province	Miscellaneous Expenses, 1921						Total miscellaneous expenses in 1921	Total miscellaneous expenses in 1922	
	Cost of purchased power for mine use	Cost of all materials and supplies used in or about the colliery	Taxes Paid						All other sundry expenses
			Royalties	Municipal	Provincial	Federal			
	\$	\$	\$	\$	\$	\$	\$	\$	
Nova Scotia.....	1,757,304	2,976,801	584,632	180,048	57,949	35,599	2,962,028	8,554,361	
New Brunswick.....	24,143	102,412	18,796	3,576	3,323	5,400	38,955	196,105	
Saskatchewan.....	1,684	53,976	10,847	7,555	389	2,903	32,826	110,180	
Alberta.....	73,335	3,131,099	473,399	100,571	166,652	149,802	1,743,569	5,838,427	
British Columbia.....		2,729,506	202,918	12,740	61,895	61,488	453,305	3,521,852	
Yukon.....			138					138	
Canada.....	1,856,466	8,993,794	1,290,730	304,490	290,208	255,192	5,230,683	18,221,563	
								17,435,034	

FELDSPAR

The first record of production in the feldspar industry in Canada dates back to about the year 1890. The production during that year was approximately 700 tons and since that date the records show an increase until in 1920, nearly 38,000 tons was produced.

The initial development work in this industry was made on deposits located in Templeton and Hull townships, in the province of Quebec. In the townships of Bedford and Portland, Ontario, near Bedford and Verona, development work was started on large feldspar deposits in the year 1900. The activities of these Ontario feldspar properties during the next few years, owing to their proximity to the American market (potteries located in New Jersey), were responsible for the almost complete cessation of work on Quebec deposits. A small quantity of high-grade dental spar has been produced from the Villeneuve quarry in Portland township, Quebec, for a number of years.

Plants for the fine-grinding of feldspar in Canada are located at Kingston, Toronto and Oshawa; the first two establishments were operated during 1922 producing about 2,200 tons of ground spar. The grinding capacity of these two plants is approximately 7,500 tons per annum.

Although feldspar occurs in many deposits throughout Canada, operations in this industry in 1922 were confined to the provinces of Ontario and Quebec. With the exception of some 3,000 tons used for domestic purposes, the entire Canadian output was shipped to United States grinding plants in the form of crude spar for use in the ceramic industry.

Twenty-five firms reported operations in 1922; of these, the most outstanding one was the "Derry Mine," near Buckingham, Quebec. This deposit was located in 1920 and is now considered the most important body of feldspar in Canada.

Table 268.—Principal Statistics of the Feldspar Industry in Canada, 1920-1922.

Year	Number of Firms	Capital employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
1920.....	20	\$ (*)	277	\$ 152,379	\$ (*)	\$ (*)	\$ 280,895
1921.....	23	484,633	143	146,776	4,237	55,628	230,754
1922.....	23	388,310	225	127,182	5,231	60,829	221,778

(*) Data not available.

Table 269.—Capital Employed in the Feldspar Industry in Canada, 1921 and 1922

Capital employed as represented by:	1921	1922
	\$	\$
Cost of lands, buildings, plant, machinery and tools.....	427,310	336,507
Cost of supplies and stock on hand.....	45,214	15,530
Cash, trading and operating accounts and bills receivable.....	12,109	36,273
Total.....	484,633	388,310

Table 270.—Employees, Salaries and Wages in the Feldspar Industry in Canada, 1921 and 1922

Year	Number			Salaries and Wages
	Male	Female	Total	
Salaried employees.....				\$
1921.....	11	1	12	18,223
1922.....	11	1	12	17,252
Wage-earners.....				
1921.....	131	.....	131	128,553
1922.....	213	.....	213	109,930
Total.....				
1921.....	142	1	143	146,776
1922.....	224	1	225	127,182

Table 271.—Number of Wage-earners in the Feldspar Industry in Canada, by Months, 1922

Month	Number	Month	Number
January.....	179	July.....	130
February.....	146	August.....	148
March.....	152	September.....	128
April.....	101	October.....	188
May.....	128	November.....	209
June.....	133	December.....	224
Average for 1922.....			213
Average for 1921.....			131

Table 272.—Miscellaneous Expenses in the Feldspar Industry in Canada, 1921 and 1922

	1921	1922
	\$	\$
Cost of all materials and supplies used.....	39,364	
Taxes—		
Municipal.....	13	Individual
Provincial.....	114	Items not
Royalties paid.....	5,722	available.
All other sundry expenses.....	10,415	
Total	55,628	60,829

GYPSUM

The first record of the production of gypsum in Canada shows that in 1822 minor operations, consisting of the extraction of a few tons of this commodity for use as fertilizer, were conducted on a bed of gypsum near Paris, Ontario. The first mill for manufacturing gypsum was erected in 1823. Since that date operations in this district have been carried on almost continuously. At the present time the Ontario Gypsum Company is the only producer, operating at Lythmore and Caledonia.

Prior to 1833, activities in the gypsum industry in Nova Scotia consisted principally of minor operations carried on by individual producers. The crude material was shipped to mills located in the United States. Several attempts were made by local producers to work up the crude rock, but these were not successful owing to the almost total dependence on the American market. When the United States duty was made prohibitive all local milling operations ceased. During 1922, two mills were in operation in this province, one situated at Iona and the other at Windsor.

The centre of activities in the gypsum industry in New Brunswick is near Hillsborough, Albert County. Operations have been carried on in this district since 1847. In 1854 there was a change in the ownership of the quarries, and shortly after this date a plaster mill was erected to supply both local and American consumers. At the present time two companies are carrying on extensive operations in this district.

Developments in the gypsum industry in Manitoba are of comparatively recent date, the year 1901 marking the first active intensive work on deposits in the province. The Manitoba Union Mining Company in that year erected a crushing and calcining mill at the head of Portage Bay on Lake Manitoba.

The principal gypsum deposits operated in Canada during 1922 were located in the following centres: Hants and Victoria counties, Nova Scotia; Albert county, New Brunswick; Haldimand county, Ontario; Gypsumville, Manitoba; and in the Lillooet District, British Columbia.

Of the nine firms producing gypsum in the Maritime provinces, six were controlled by American capital. The output of these six mines was exported in the raw form to the United States, where it is treated in the manufacturing plants owned by the same interests. The remaining three firms quarried and calcined their own output principally for consumption in Canada.

In Ontario and Manitoba the raw gypsum was used mainly in the manufacture of cement, wall plaster, wall-board, fire-proof tile and blocks and plaster of paris. The British Columbia deposit was operated rather as a continuance of experimental work from the previous year and the resultant product was sold to the farmers for use on the land.

Operations in this industry were conducted by thirteen producers, eleven of which were incorporated companies and two individual producers in British Columbia.

Comparative figures for the capital employed by operating gypsum companies in 1921 and 1922 are shown in the following table. Owing to the fact that there was only one operator in Ontario, one in Manitoba, and two in British Columbia, statistics regarding these provinces have been combined.

Table 273.—Principal Statistics of the Gypsum Industry in Canada, 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
1920.....	11	\$	1,016	\$ 955,602	\$	\$	\$ 1,893,991
1921.....	11	3,849,776	1,039	774,551	116,554	565,839	1,785,538
1922.....	13	4,092,090	1,055	909,072	127,246	436,705	2,160,898

*Data not available.

Table 274.—Capital Employed in the Gypsum Industry in Canada by Provinces, 1921 and 1922

Capital employed as represented by:	1921				1922			
	Nova Scotia	New Brunswick	Ontario, Manitoba and British Columbia	Canada	Nova Scotia	New Brunswick	Ontario, Manitoba and British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, plant machinery and tools.....	879,960	439,099	1,426,328	2,745,387	1,495,717	268,100	1,317,177	3,080,994
Cost of all materials and supplies on hand.....	118,214	113,372	182,999	414,585	109,909	60,778	157,140	327,827
Cash, trading and operating accounts and bills receivable.....	410,250	86,550	193,004	689,804	420,548	3,903	258,818	683,269
Total.....	1,408,424	639,021	1,802,331	3,849,776	2,026,174	332,781	1,733,135	4,092,090

Table 275.—Employees, Salaries and Wages in the Gypsum Industry in Canada, 1921 and 1922

	1921				1922			
	Number			Salaries and Wages	Number			Salaries and Wages
	Male	Female	Total		Male	Female	Total	
SALARIED EMPLOYEES—				\$				\$
Salaried officers of corporation.....					8		8	41,059
Superintendents, managers, etc....	20	1	21	54,634	21	1	22	50,170
Technical employees, engineers, etc.....	4		4	8,645	9		9	16,825
Clerks, stenographers, etc.....	7	4	11	9,635	7	6	13	16,204
Total.....	31	5	36	72,914	45	7	52	124,258
WAGE-EARNERS—								
Mine.....	516		516	402,890	723		723	518,268
Mill.....	250		250	298,747	280		280	266,546
Total.....	766		766	701,637	1,003		1,003	784,814
Grand total.....	797	5	802	774,551	1,048	7	1,055	909,072

Table 276.—Average Number of Employees in the Gypsum Industry in Canada by Provinces, 1922

Months	Nova Scotia		New Brunswick		Ontario		Manitoba		Total for Canada	
	Mine	Mill	Mine	Mill	Mine	Mill	Mine	Mill	Mine	Mill
January.....	137	15	97	105	50	57	54	26	338	203
February.....	148	15	116	105	65	66	58	27	387	213
March.....	292	15	119	102	49	76	69	16	529	209
April.....	382	16	200	120	62	65	85	21	729	232
May.....	433	20	174	110	82	70	83	32	772	232
June.....	481	25	192	142	87	71	86	35	846	273
July.....	457	22	175	165	90	74	86	35	808	296
August.....	487	25	171	160	97	75	85	22	840	282
September.....	474	25	182	150	95	80	84	22	835	277
October.....	502	67	164	150	114	81	80	22	860	320
November.....	533	63	162	140	101	72	71	18	867	293
December.....	507	49	153	110	58	53	61	17	779	229
Average.....	409	56	159	130	80	69	75	25	723	250

Table 277.—Miscellaneous Expenses in the Gypsum Industry in Canada, 1921 and 1922

	1921	1922
Cost of purchased power.....	\$ 23,876	\$ Individual
Cost of all materials and supplies used.....	428,905	Items
Royalties paid.....	495	
Taxes—		
Municipal.....	20,941	not
Federal.....	3,125	
All other sundry expenses.....	88,497	Available
Total.....	565,839	436,705

MICA

There was a considerable increase in the sales of mica during 1922 owing to the revival of activity in the building and automobile industries. Large quantities of ground scrap mica are also used in the manufacture of roofing material. Sheet mica is consumed in the electrical industry in the manufacture of spark plugs, generators, condensers and starters. The consumption of mica in Canadian industries during 1922 was reported as follows: roofing materials, 359 tons; wall paper, 200 tons; electrical goods, 31 tons; lubricants, 30 tons; and rubber, 22 tons.

The important deposits of mica in Canada are located in the counties of Ottawa and Labelle in Quebec, and Lanark, Leeds and Frontenac in Ontario. The product of these mines, in the main part is shipped first to mica-trimming shops, conveniently located, where it is either rough-tobbed or split and trimmed prior to exportation to the United States or Great Britain.

Twenty operators in Canada reported shipments of mica during 1922. Of this number fourteen were in Quebec, and six in Ontario.

Statistics relating to the extensive mica-trimming shops in Ontario and Quebec have not been included in this report, but will be treated under a separate heading in the report on "Manufactures of Non-Metallic Minerals."

Table 278.—Principal Statistics of the Mica Industry in Canada, 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		\$		\$	\$	\$	\$
1920.....	20	(a)	186	145,247	(a)	(a)	376,022
1921.....	20	576,237	104	74,432	4,354	19,743	70,063
1922.....	20	441,802	147	64,641	1,907	45,825	152,263

(a) Data not available.

Table 279.—Capital Employed in the Mica Mining Industry in Canada by Provinces, 1921 and 1922

Capital employed as represented by	1921			1922		
	Quebec	Ontario	Canada	Quebec	Ontario	Canada
	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, plant machinery and tools.....	137,080	86,073	223,153	41,401	52,183	93,584
Cost of all materials and supplies on hand....	21,654	294,644	316,298	22,911	271,844	294,755
Cash, trading and operating accounts and bills receivable.....	23,933	12,853	36,786	40,610	12,853	53,463
Total.....	182,667	393,570	576,237	104,922	336,880	441,802

Table 280.—Number of Wage-Earners, by months, and Wages Paid in the Mica Industry in Canada, 1922.

Month	Number		Month	Number	
	Mine	Mill		Mine	Mill
January.....	38	35	July.....	66	49
February.....	39	34	August.....	58	62
March.....	38	34	September.....	56	93
April.....	51	34	October.....	56	109
May.....	61	43	November.....	52	127
June.....	75	46	December.....	37	109

Average for the year..... 134

Total wages paid in 1921.....	\$ 66,694
Total wages paid in 1922.....	\$ 51,603

Table 281.—Miscellaneous Expenses Incurred in the Mica Industry in Canada by Provinces, 1921 and 1922

	Quebec	Ontario	Canada
	\$	\$	\$
In 1921—			
Cost of purchased power.....	50		50
Cost of all materials and supplies used.....	6,041	2,083	8,124
Royalties paid.....	85		85
(Municipal.....)	636	60	696
Taxes (Provincial.....)	105	59	701
(Federal.....)	3,338		3,338
All other sundry expenses.....	2,101	4,648	6,749
Total.....	12,356	7,387	19,743
In 1922—			
Total.....	35,608	10,217	45,825

NATURAL GAS

No records are available prior to 1892, as to the production of natural gas in Canada. An estimate of the value of gas produced during that year was placed at \$150,000.

The extensive developments of the oilfields in Ontario made available for consumption large quantities of natural gas. From 1892 to 1902 inclusive, Ontario was the only contributor of this commodity. In 1903, the first production from other provinces was recorded. The value of natural gas produced during 1903 was approximately \$202,000 and from that year onward there was an annual increase in production until in 1917, the grand total value was \$5,045,298. From that date until 1922, considerable decreases in valuation were recorded.

A summary of the natural gas industry in Ontario during 1922 is provided in the following excerpt from the report issued by Col. R. B. Harkness, Commissioner of Gas for Ontario:—

"The decline in production, which began in 1918, is becoming more gradual from year to year. This situation is attributed to a natural decline in rock pressure, a raise in rates, the stoppage of leaks in transmission lines and improvement in burning appliances, the last two having been the special effort of the Department in 1922. Drilling activities in 1922 were stimulated by a raise in rates, but results were somewhat disappointing, one company in Lambton and Kent counties having drilled ten deep wells from which only a small flow of gas was obtained, the majority being abandoned. More success attended drilling in Haldimand and Norfolk counties where a small field was discovered. Two fairly good wells were drilled at Point Abino in Welland county. Four "wildcat" wells in Halton and Peel have brought to light a shallow field of considerable extent, but with light pressure, 65 pounds".

The producing fields in Alberta, during 1922 were, the Medicine Hat; Bow Island (about 40 miles west of Medicine Hat); and the Turner Valley gas field (35 miles southeast of Calgary). The total number of wells reported as producing at the end of the year was 60, as compared with 64 wells reported active in 1921. In addition to the fields mentioned previously, wells have also been bored successfully in the Viking gas field situated approximately 80 miles southeast of Edmonton.

The producing wells in the province of New Brunswick are confined to the Stony Creek field in Albert County, about eight miles south of Moncton. The natural gas produced is used largely for power, domestic heating and lighting purposes in Moncton. At the end of 1922 there were 19 wells in operation, one less than was reported active at the beginning of the year.

Table 282.—Principal Statistics of the Natural Gas Industry in Canada, 1920-1922

Year	Number of Firms	Number of Wells	Capital Employed	Number of Employees	Salaries and Wages	Miscellaneous Expenses	Selling Value of Products
			\$		\$	\$	\$
1920.....	104	1,954	(a)	616	643,320	(a)	4,232,642
1921.....	103	2,021	30,368,478	885	882,907	1,405,222	4,594,164
1922.....	132	1,981	31,373,817	921	939,194	1,458,675	5,846,501

(a) Data not available.

Table 283.—Capital Employed in the Natural Gas Industry in Canada by Provinces, 1921 and 1922

Capital employed as represented by	1921				1922			
	New Brunswick	Ontario	Alberta	Canada	New Brunswick	Ontario	Alberta	Canada
	\$	\$	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, plant machinery and tools.....		13,795,996	12,030,245	25,826,241		14,293,093	12,442,114	26,735,207
Cost of all materials and supplies on hand.....		201,074	392,916	593,990		216,009	472,310	688,319
Cash, trading and operating accounts and bills receivable....		3,331,687	407,187	3,738,874		3,260,562	488,665	3,749,227
Total.....	209,373	17,328,757	12,830,348	30,368,478	201,064	17,769,664	13,403,089	31,373,817

Table 284.—Employees, Salaries and Wages in the Natural Gas Industry in Canada, 1921 and 1922

	1921				1922			
	Number			Salaries and Wages	Number			Salaries and Wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
SALARIED EMPLOYEES—								
Salaried officers of corporation.....					23	2	25	53,121
Superintendents, managers, etc....	43		43	92,374	41		41	62,164
Technical employees, engineers, etc.....	6		6	10,425	7		7	12,960
Clerks, stenographers, etc.....	41	35	76	75,100	109	49	158	114,362
Total.....	90	35	125	177,899	180	51	231	242,607
WAGE-EARNERS—Total.....	760		760	705,008	690		690	696,587
Grand Total.....	859	35	885	882,907	870	51	921	939,194

Table 285.—Number of Wage-earners in the Natural Gas Industry in Canada, by Months and by Provinces, 1922

Month	New Brunswick	Ontario	Alberta	Canada
January.....	8	524	143	675
February.....	8	507	131	646
March.....	12	472	132	616
April.....	12	471	159	642
May.....	13	513	160	686
June.....	19	572	154	745
July.....	13	517	168	698
August.....	16	509	178	703
September.....	16	508	169	693
October.....	21	552	169	732
November.....	19	587	163	769
December.....	13	510	130	653
Average.....	15	520	155	690

Table 286.—Miscellaneous Expenses in the Natural Gas Industry in Canada, 1921 and 1922

	1921	1922
	\$	\$
Cost of purchased power.....	10	Individual items not available
Cost of all materials and supplies used.....	113,445	
Royalties paid.....	39,033	
Taxes {Municipal.....	64,418	
{Provincial.....	54,485	
{Federal.....	122,947	
All other sundry expenses.....	1,010,884	
Total.....	1,405,222	1,458,675

Table 287.—Number of Gas Wells in Canada, by Provinces, 1920, 1921 and 1922

	New Brunswick	Quebec	Ontario	Manitoba	Alberta	Canada
Productive wells at beginning of year.....1920	23	*6	1,872	1	67	1,969
.....1921	21	*6	1,862	1	61	1,954
.....1922	20		1,930	1	64	2,015
Number of productive wells drilled.....1920			93			93
.....1921			105		3	108
.....1922			87		1	88
Number of dry wells drilled.....1920			24		2	26
.....1921			21			22
.....1922	1		37			38
Number of wells abandoned.....1920	2		117		3	122
.....1921	1		112			113
.....1922	1		118		1	120
Productive wells at end of year.....1920	21	*6	1,862	1	64	1,954
.....1921	20	*6	1,930	1	64	2,021
.....1922	19		1,901	1	60	1,981

*Idle.

Table 288.—Natural Gas Wells in Ontario, by Townships, 1922

Township	No. of Producing Wells in operation Dec. 31, 1922	No. of Wells abandoned this year	No. of Dry Wells drilled this year	No. of Producing Wells drilled this year
Amabel.....	1	1		
Barton.....	2			
Bayham.....	55	1		
Bertie.....	84	14	2	4
Binbrook.....	69	4		
Caistor.....	49	1		
Canboro.....	159	6	2	6
Cayuga, North.....	62	1	1	1
Cayuga, South.....	59	3		
Charlotteville.....	16			2
Crowland.....	49	1	1	
Dawn.....	5		4	3
Dorchester, North.....	3			3
Dover, West.....	9			
Dunn.....	9		2	1
Dunwich.....	17	2		
Enniskillen.....		1		
Euphemia.....	3			
Gainsboro.....	6			
Glanford.....	2			
Gosfield.....	27			
Houghton.....		1		
Humberstone.....		3		
Mersea.....	107	11		
Middleton.....	4		2	
Malahide.....	19	2		
Moulton.....	2	1		1
Oneida.....	103	3	2	19
Onondaga.....	30	1	3	8
Rainham.....	113			
Raleigh.....	23	7		
Romney.....	97	2		1
Sarnia.....	97	4	1	
Seneca.....	16		3	1
Sherbrooke.....	162	15	9	12
Tilbury, East.....	12	1	1	
Wainfleet.....	137	13	1	10
Walpole.....	48	3	1	
Walsingham, North.....	167	7	2	12
Walsingham, South.....	6			
Windham.....	14			
Willoughby.....	5			
Woodhouse.....	44	7		
	65	1		3
Total.....	1,901	118	37	87

Table 289.—Consumption of Natural Gas in Ontario, by Municipalities, 1922

Place	Domestic				Industrial		Total	
	No. of Users		Gas used		No. of Users	Gas used	No. of Users	Gas used
	Pay	Free	Pay	Free				
			M cu. ft.	M cu. ft.		M cu. ft.		M cu. ft.
Aylmer.....	700		39,475				700	39,475
Brantford.....	4,312		117,789		39	5,184	4,351	122,973
Bartonville.....	106		4,612				106	4,612
Bridgeburg.....	580	4	36,110	203			584	36,313
Binbrook.....	4		418				4	418
Belmont.....	106		4,187				106	4,187
Belle River.....	165	2	19,572	199	5	813	172	20,584
Blenheim.....	539	3	68,813	1,556	3	886	545	71,255
Chatham.....	3,600		503,756		50	10,083	3,650	603,839
Comber.....	150		20,309		6	2,891	156	23,200
Chippawa.....	62		2,120				62	2,120
Caledonia.....	453		49,295			2,213	453	51,508
Canfield.....	33		3,491				33	3,491
Crystal Beach.....	630		11,129				630	11,129
Cayuga.....	207		26,437				207	26,437
Dorchester.....	123		10,758				123	10,758
Dutton.....	261	7	29,594	572	5	1,135	273	31,301
Dunnville.....	922	9	101,707	6,392	18	5,875	949	113,974
Delhi.....	250		22,103		6	1,487	256	23,590
Dundas.....	1,040		35,646		10	585	1,050	36,231
Dresden.....	540		57,034		3	1,372	543	58,406
Eden.....	23	4	1,722	218	1	222	28	2,162
Essex.....	455		56,610		12	5,714	467	62,324
Fingal.....	47	2	4,163	44	1	208	50	4,415
Fairground.....	15		892				15	892
Fort Erie.....	353		27,012				353	27,012
Ford.....	438		55,122				438	55,122
Galt.....	1,431	3	52,962	774	37	2,402	1,471	56,138
Glenwood.....		1		2,506			1	2,506
Hamilton.....	21,884		572,431		15	32,752	21,899	605,183
Hagersville.....	369		35,997				369	35,997
Highgate.....	119	4	15,562	674			123	16,236
Ingersoll.....	1,190		82,366		5	1,117	1,195	83,483
Jarvis.....	184		24,030		2	1,448	186	25,478
Kingsville.....	557	1	82,759	183	5	25,059	563	108,001
Lambeth.....	88		6,245				88	6,245
Lyndoch.....	40		3,406				40	3,406
Leamington.....	1,175		180,694		5	227	1,180	180,921
Mabee.....	6	1	350	29			7	379
Niagara Falls.....	2,549		135,138				2,549	135,138
Petrolia.....	800		108,039		11	2,297	811	110,336
Port Burwell.....	235	2	15,396	26			237	15,422
Paris.....	570	1	25,945	158	4	530	575	26,633
Port Dover.....	470		55,071		5	1,133	475	56,204
Port Rowan.....	244	1	19,724	492			245	20,216
Rodney.....	238	3	30,576	109	2	235	243	30,920
Ridgetown.....	630	3	79,140	2,076	10	3,272	643	84,488
Sandwich.....	443		55,751				443	55,751
St. Catharines.....	3,407	13	172,812	711	5	3,489	3,425	177,012
Sarnia.....	4,010		460,019		7	5,387	4,017	465,406
Shedden.....	89	2	8,191	46	6	1,251	97	9,488
St. George.....	125		5,761		2	18	127	5,779
Straffordville.....	71	3	6,489	109			74	6,598
Simcoe.....	1,303	15	185,659	7,840	16	11,703	1,334	205,202
St. Williams.....	99		7,024		1	349	100	7,373
Selkirk.....	137	1	18,097	83	2	955	140	19,135
Smithville.....	156		13,786				156	13,786
Thorold.....	480	3	25,325	467			483	25,792
Tillsonburg.....	908	14	78,274	866	6	2,084	928	81,224
Tecumseh.....	145		19,069				145	19,069
Tilbury.....	402	2	51,428	301	8	2,873	412	54,602
Tupperville.....	47		5,438		4	1,124	51	6,562
Vienna.....	120		10,698				120	10,698
Victoria.....	71		6,146				71	6,146
Walkerville.....	1,395		172,134			11,697	1,395	183,831
Windsor.....	7,189		893,029			3,424	7,189	896,453
Woodstock.....	2,046		94,892				2,046	94,892
Wallacetown.....	65	1	6,105	24	1	672	67	6,801
West Lorne.....	211	7	28,441	428	4	920	222	29,789
Welland.....	1,911	3	93,198	115			1,914	93,313
Wentworth.....	38		1,284				38	1,284
Wheatley.....	221		31,572		9	3,305	230	34,877
Wallaceburg.....	1,014		136,458		19	180,628	1,033	317,086
Total.....	74,996	115	5,512,787	27,201	350	339,019	75,461	5,879,007

Table 290.—Consumption of Natural Gas in Ontario, by Townships in 1922

Township	Domestic				Industrial		Total	
	No. of Users		Gas used		No. of Users	Gas used	No. of Users	Gas used
	Pay	Free	Pay	Free				
			M cu. ft.	M cu. ft.		M cu. ft.		M cu. ft.
Aldboro.....	21	1	2,735	434			22	3,169
Ancaster.....	51		4,263				51	4,263
Bayham.....	31	11	2,883	1,836			42	4,719
Brant.....	169		10,061				169	10,061
Barton.....	860		66,039		1	89	861	66,128
Binbrook.....	56	37	8,120	7,477	1	260	94	15,857
Bertie.....	568	69	33,203	20,858			637	54,061
Cayuga, N.....	22	16	2,659	3,075			38	5,734
Cayuga, S.....	67	28	4,579	5,327			95	9,906
Canboro.....	72	46	7,157	8,767			118	15,924
Caistor.....	61	4	5,702	818			65	6,520
Crowland.....	8	3	547	906			11	1,453
Charlotteville.....		9		1,557			9	1,557
Chatham.....	80	1	11,666	244			81	11,910
Camden.....	20		2,916				20	2,916
Dorchester ct.....	32		2,363				32	2,363
Dunn.....	65	3	6,203	556			68	6,759
Dunwich.....	60	1	5,930	34			61	5,964
Dumfries S.....	9		274				9	274
Dover.....	234	1	34,226	98			235	34,324
Dawn.....	3		437				3	437
Emiskillen.....	68		9,919				68	9,919
Glanford.....	102	3	15,101	750	1	307	106	16,158
Graham.....	19		1,290				19	1,290
Gainsboro.....	12		20				12	20
Gosfield N.....	143	4	9,602	62			147	9,664
Gosfield S.....	282	2	34,511	91	81	24,091	365	58,693
Harwich.....	410	6	63,139	1,640			416	64,779
Howard.....	151	2	22,470	520			153	22,990
Humberstone.....	103	36	6,486	10,892			139	17,378
Louth.....	5		317				5	317
Malahide.....	61		2,640				61	2,640
Moulton.....	114	17	8,178	3,253	2	1,160	133	12,591
Middleton.....				1,239			7	1,239
Mersea.....	264	3	44,310	985	130	33,009	397	78,304
Maidstone.....	53	3	7,728	584			56	8,312
Moore.....	440		64,164				440	64,164
Oxford.....	82	1	13,557	106	1		84	13,670
Oneida.....	54	9	5,347	1,664		7	63	7,011
Onondaga.....		12		1,709			12	1,709
Raleigh.....	724	48	107,861	11,228	13	12,421	785	131,510
Rainham.....	116	31	14,818	7,014	1	173	148	22,005
Romney.....	106	34	14,075	10,229			140	24,304
Rochester.....	166	6	24,207	1,247			172	25,454
Southwold.....	107	3	8,280	121	2	1,463	112	9,864
Saltfleet.....	16		2,821				16	2,821
Seneca.....	51	28	6,746	5,629			79	12,375
Stamford.....		3		910			3	910
Sandwich E.....	211	2	30,775	230			213	31,005
Sandwich W.....	20		2,915				20	2,915
Sandwich S.....	44		6,416				44	6,416
Sombra.....	130		18,958		6	1,988	136	20,946
Sarnia.....	3	1	437	227	15	5,032	19	5,696
Townsend.....	35		4,973				35	4,973
Tilbury E.....	274	91	39,995	36,918	2	19,411	367	96,324
Tilbury W.....	18		2,624				18	2,624
Tilbury N.....	20	1	2,916	88			21	3,004
Westminster.....	140	7	14,962	1,083	1	99	148	16,144
Wainfleet.....	89	26	5,191	9,188			115	14,379
Willoughby.....	23	29	1,439	8,758			52	10,197
Windham.....	14		1,904				14	1,904
Woodhouse.....	154	20	22,792	3,458			174	26,250
Walpole.....	242	48	31,627	9,855	2	288	292	41,770
Walsingham.....		9		1,512			9	1,512
Total.....	7,555	722	887,474	183,177	259	99,798	8,536	1,170,449

PETROLEUM

The production of petroleum in Canada dates back to 1857, when a shallow well was dug near Enniskillen (now known as Oil Springs), in the province of Ontario.

Early in January, 1862, a pioneer oil prospector brought in the first flowing well at Oil Springs, Ontario, and before the fall of the same year there were approximately 35 producing wells in operation. According to information available some of these wells produced from 3,000 to 6,000 barrels per day.

In 1865, Petrolia came into existence as a large producer and since that date has maintained its position among the leading oil-fields in Canada. Prior to this discovery, oil deposits were located in Kent county, at Bothwell.

Although Petrolia, Oil Springs and Bothwell are by far the oldest producing fields in Canada, these three fields continue to rank as the premier producers in this country.

On December 31, 1922 there were 2,867 wells in operation in the province of Ontario while at the end of the previous year, 2,997 wells were reported active.

The first attempt to develop the oil deposits in Westmoreland County in New Brunswick, was made in 1859. The four wells drilled then were not successful as fresh water seeped in, ruining them. No further drilling was attempted until 1879, then two more wells were sunk, one at St. Joseph and the other at Dover. From 1900 to 1906 some 72 wells were drilled. The distribution of this number was as follows; 67 in Westmoreland county, 4 in Albert county and 1 in Kent county. This marked the opening up of the present Stony Creek oil and gas field. At the end of 1922 there were 9 petroleum wells in operation in this district as compared with 7 reported as active on December 31, 1921.

In May, 1914, considerable interest was taken in the Turner Valley oil field in Alberta. The centre of this field is about 25 miles south of Calgary. Since 1914 operations have been carried on in this district by some 5 companies. In 1922 only 3 companies, operating 4 petroleum wells reported production.

The new oil fields in the Mackenzie district of the North West Territories have been the scene of considerable activity during the past several years. The Imperial Oil Company commenced drilling operations in this district, about 40 miles below Fort Norman, early in 1920.

In the Coutts-Sweetgrass district, southern Alberta, a number of companies carried on drilling operations during 1922. Although no production of petroleum was reported, drilling continued throughout the year.

Tables 292 to 295 inclusive do not contain any data regarding New Brunswick wells as these have been included under "Natural Gas."

Table 291.—Principal Statistics of the Petroleum Industry in Canada, 1920-1922

Year	Number of Firms	Number of Wells	Capital Employed	Number of Employees	Salaries and Wages	Miscellaneous Expenses	Selling Value of Products
			\$		\$	\$	\$
1920.....	122	3,027	(a)	202	182,787	(a)	822,235
1921.....	120	3,009	3,214,159	190	215,791	136,277	641,533
1922.....	120	2,880	2,764,099	160	167,176	116,678	611,176

(a) Data not available.

Table 292.—Capital Employed in the Petroleum Industry in Canada, by Provinces, 1921 and 1922

Capital employed as represented by	1921			1922		
	Ontario	Alberta	Canada	Ontario	Alberta	Canada
	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, plant machinery and tools.....	1,797,746	1,111,968	2,909,714	1,910,967	770,585	2,681,552
Cost of all materials and supplies on hand....	19,766	19,997	39,763	13,117	27,571	40,688
Cash, trading and operating accounts and bills receivable.....	44,710	219,972	264,682	31,284	10,575	41,859
Total.....	1,862,222	1,351,937	3,214,159	1,955,368	808,731	2,764,099

Table 293.—Employees, Salaries and Wages in the Petroleum Industry in Canada, by Provinces, 1921 and 1922

	1921			1922		
	Ontario	Alberta	Canada	Ontario	Alberta	Canada
SALARIED EMPLOYEES—						
Salaried officers of corporation.....No.				7	1	8
Salaries.....\$				\$ 9,302	\$ 4,800	\$ 14,102
Superintendents, managers, etc.....No.	7	6	13	9		9
Salaries.....\$	\$ 11,930	\$ 16,858	\$ 28,788	\$ 11,665		\$ 11,665
Technical employees, engineers, etc.No.	1		1	1		1
Salaries.....\$	\$ 772		\$ 772	\$ 1,910		\$ 1,910
Clerks, stenographers, etc.....No.	2	3	5	2	1	3
Salaries.....\$	\$ 970	\$ 1,349	\$ 2,319	\$ 1,220	\$ 1,020	\$ 2,240
Total.....No.	10	9	19	19	2	21
Salaries.....\$	\$ 13,672	\$ 18,207	\$ 31,879	\$ 24,097	\$ 5,820	\$ 29,917
WAGE-EARNERS—						
Total.....No.	147	24	171	134	5	139
Wages.....\$	\$ 149,395	\$ 34,517	\$ 183,912	\$ 132,402	\$ 4,857	\$ 137,259
Grand Total.....No.	157	33	190	153	7	160
Salaries and Wages.....\$	\$ 163,067	\$ 52,724	\$ 215,791	\$ 156,499	\$ 10,677	\$ 167,176

Table 294.—Monthly Average Number of Wage-Earners in the Petroleum Industry in Canada, by Provinces, 1922

Month	Ontario	Alberta	Canada
January.....	130	3	133
February.....	131	3	134
March.....	134	2	136
April.....	132	4	136
May.....	134	3	137
June.....	135	5	140
July.....	135	4	139
August.....	136	5	141
September.....	136	6	142
October.....	140	4	144
November.....	137	6	143
December.....	134	6	140
Average.....	134	5	139

Table 295.—Miscellaneous Expenses in the Petroleum Industry in Canada, by Provinces, 1921 and 1922

	Ontario	Alberta	Canada
In 1921—			
Cost of purchased power.....	\$ 18,013	\$	\$ 18,013
Cost of all materials and supplies used.....	58,379	899	59,278
Royalties paid.....	7,463		7,463
Taxes—			
Municipal.....	6,011	114	6,125
Provincial.....	872	1,064	1,936
Federal.....	15,733		15,733
All other sundry expenses.....	27,146	583	27,729
Total.....	133,617	2,660	136,277
In 1922—Total.....	105,820	10,858	116,678

Table 296.—Petroleum Wells in Canada, 1920, 1921 and 1922

		New Brunswick	Ontario	Alberta	British Columbia	Canada
Productive wells at beginning of year.....	1920	6	3,139	5		3,150
	1921	7	3,015	5		3,027
	1922	7	2,997	5		3,009
Number of wells drilled.....	1920	1	56	6	4	67
	1921	1	9			10
	1922	2	7			9
Number of wells abandoned.....	1920	3	353	1	2	359
	1921	1	113			114
	1922		95			95
Number of productive wells at end of year.....	1920	7	3,015	5		3,027
	1921	7	2,997	5		3,009
	1922	9	2,867	4		2,880

SALT

The production of salt in the province of Ontario was first recorded in 1866. A company was formed in that year to drill for oil on the north bank of the Maitland river, and, while no success attended the efforts of the drillers in their search for oil, a bed of rock salt was found at a depth of 964 feet. In September, 1866, this company (incorporated under the name of the Goderich Petroleum Company, later changed to "Goderich Salt Company") commenced pumping brine. In the initial working in connection with these deposits the refining was done by the kettle method, which was soon discarded and replaced by the pan method of evaporation.

Wells were drilled and plants erected at Clinton and Seaforth, Ontario, and four refineries were in operation at Goderich in 1879; at the present time there are only two firms operating at Goderich.

In 1922, wells were operated in Ontario at Windsor, Sandwich, Courtright, Goderich, Sarnia, Warwick, Wingham and in Anderdon township.

The mining of rock salt was carried on by one firm in Nova Scotia, at Malagash, Cumberland county. Considerable quantities of coarse salt, rock salt and land salt were sold during the year. The last-named was found to contain potash, and was used to some extent as a fertilizer.

For the whole of Canada, ten firms, operating eleven salt works, reported activity during 1922. Two of these plants were engaged primarily in the production of brine for use in the manufacture of caustic soda and soda ash in the chemical works of the producing companies.

Table 297.—Principal Statistics of the Salt Industry in Canada 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		\$		\$	\$	\$	\$
1920.....	12	2,221,606	345	472,031	531,880	409,493	1,544,724
1921.....	12	2,267,708	277	411,832	527,013	381,126	1,673,685
1922.....	10	2,205,184	371	432,261	369,000	407,105	1,628,323

Table 298.—Capital Employed in the Salt Industry in Canada, 1921 and 1922

Capital employed as represented by—	1921	1922
	\$	\$
Cost of lands, buildings, machinery and tools.....	1,417,078	1,399,424
Cost of all materials and supplies on hand.....	452,746	228,860
Cash, trading and operating accounts and bills receivable.....	397,884	576,900
Total.....	2,267,708	2,205,184

Table 299.—Employees, Salaries and Wages in the Salt Industry in Canada, 1921 and 1922

	1921				1922			
	Number of Employees		Total	Salaries and Wages	Number of Employees		Total	Salaries and Wages
	Male	Female			Male	Female		
SALARIED EMPLOYEES—				\$				\$
Salaried officers of corporation...	3		3	8,200	7		7	28,582
General superintendents and managers.....	15		15	38,528	11		11	26,797
Technical experts, engineers, chemists, accountants.....	9	1	10	17,960	10		10	11,714
Clerks, stenographers, salesmen and other salaried employees..	18	7	25	26,641	11	9	20	27,506
Total.....	45	8	53	91,329	39	9	48	94,599
WAGE-EARNERS—								
Total.....	245	32	277	320,503	293	30	323	337,662
Grand total	290	40	330	411,832	332	39	371	432,261

Table 300.—Number of Wage-earners in the Salt Industry in Canada, by Months, 1922

Month	Number		Month	Number	
	Male	Female		Male	Female
January.....	237	30	July.....	301	29
February.....	275	31	August.....	298	29
March.....	271	31	September.....	290	33
April.....	246	30	October.....	299	32
May.....	261	29	November.....	282	30
June.....	276	30	December.....	244	27

Table 301.—Miscellaneous Expenses in the Salt Industry in Canada, 1921 and 1922

	1921	1922
	\$	\$
Rent of offices, works and machinery.....	2,539	
Cost of purchased power.....	8,711	
Insurance (premium for the year, only).....	26,154	Individual
Taxes—		
Municipal.....	3,108	Items
Provincial.....	5,735	
Federal.....	28,351	not
Royalties, use of patents, etc.....	360	available
Advertising expenses.....	25,769	
Travelling expenses.....	15,161	
Repairs to buildings and machinery.....	89,742	
All other sundry expenses.....	175,501	
Total	381,126	407,105

MISCELLANEOUS NON-METALLIC MINERAL INDUSTRIES

Table 302.—Capital Employed in the Miscellaneous Non-metallic Mineral Industries in Canada, 1921 and 1922

Industry	1921				1922			
	Lands, Buildings, Plant, Machinery and Tools	Cost of all Materials and Supplies, on hand	Cash, Trading and Operating Accounts and Bills Receivable	Total	Lands, Buildings, Plant Machinery and Tools	Cost of all Materials and Supplies on hand	Cash, Trading and Operating Accounts and Bills Receivable	Total
Fluorspar.....	\$ 138,399	\$ 6,791	\$ 18,067	\$ 163,257	\$ 317,943	\$ 5,394	\$	\$ 323,337
Grindstones.....	216,390	15,000	55,603	286,933	203,657	20,892	35,117	259,666
Iron Oxides.....	175,630	28,678	3,259	207,567	184,750	7,678	25,000	217,428
Magnesite.....	1,956,533	152,694	40,000	2,149,227	1,705,708	85,087	45,143	1,835,938
Quartz.....	607,779	63,424	272,015	943,238	659,051	42,224	5,905	707,180
Talc.....	428,053	27,596	31,394	487,073	487,028	22,523	84,468	594,019
Other non-metallics ¹	2,007,053	371,236	20,453	2,398,742	2,727,951	468,375	26,213	3,222,539
Total.....	5,529,837	665,419	440,791	6,636,097	6,286,088	652,173	221,846	7,160,107

¹Includes actinolite, barytes, chromite, corundum, magnesite sulphate, manganese, mineral waters, pyrites, sodium sulphate and tripolite.

Table 303.—Employees, Salaries and Wages in the Miscellaneous Non-metallic Mineral Industries in Canada, 1921 and 1922

		1921					1922				
		Super-intendents and managers	Technical Employees	Clerks and Stenographers	Wage Earners and Wages	Total	Super-intendent and managers	Technical Employees	Clerks and Stenographers	Wage Earners and Wages	Total
Fluorspar	No. 3	1		77	81	1		1	50	52	
	Salaries \$ 3,761	900		24,761	29,422	2,490		120	22,970	25,589	
Grindstones	No. 6			50	57	6		1	33	40	
	Salaries \$ 9,798		742	44,645	55,185	8,298		1,000	21,901	31,199	
Iron oxides	No. 2			29	32			1	47	49	
	Salaries \$ 4,800		900	36,993	42,693	3,000		1,200	40,639	44,839	
Magnesite	No. 5	2		71	81	3		1	126	132	
	Salaries \$ 7,550	3,600	3,856	73,650	88,656	6,476	1,659	2,417	48,026	58,575	
Quartz	No. 4	1		86	94	6		2	143	151	
	Salaries \$ 8,866	6,000	4,611	104,772	124,249	14,094	2,660		57,658	74,412	
Talc	No. 3		2	34	39	6		2	71	81	
	Salaries \$ 16,900		2,825	44,975	64,703	20,334	3,800	2,450	61,925	88,509	
Other non-metallics ¹	No. 12	3	7	312	334	18	3	12	131	164	
	Salaries \$ 31,133	4,135	9,176	205,972	250,416	29,814	4,800	11,771	84,601	130,986	
Total	No. 35	7	17	659	718	41	8	19	601	669	
	Salaries \$ 82,898	14,635	22,110	535,771	655,324	84,506	12,919	18,958	337,729	454,103	

¹Includes actinolite, barytes, chromite, corundum, magnesite sulphate, manganese, mineral waters, pyrites, sodium sulphate and tripolite.

Table 304.—Number of Wage-earners, by Months, in the Miscellaneous Non-metallic Mineral Industries in Canada, 1922

Month	Fluor-spar	Grind-stones	Iron-Oxides	Magne-site	Quartz	Talc	Other Non-Metallics	Total
January.....	1	10	34	162	25	29	73	334
February.....	3	4	34	106	16	30	92	285
March.....	3	5	34	52	14	31	110	249
April.....	1	14	34	46	14	39	90	238
May.....	7	38	37	96	70	48	105	401
June.....	95	69	47	138	101	58	124	632
July.....	85	47	53	123	156	59	123	646
August.....	82	38	58	134	150	69	119	650
September.....	67	30	55	134	124	83	116	619
October.....	4	33	59	113	160	76	94	544
November.....	5	36	41	127	121	75	61	466
December.....		23	37	121	78	77	60	396
Average.....	50	33	47	126	143	71	131	601

Table 305.—Miscellaneous Expenses in the Miscellaneous Non-metallic Mineral Industries in Canada, 1921 and 1922

	Industry							Total
	Fluorspar	Grind-stones	Iron Oxides	Magne-site	Quartz	Talc	¹ Other Non-Metallics	
<i>In 1921—</i>	\$	\$	\$	\$	\$	\$	\$	\$
Cost of purchased power.....	36		3,120	5,169	2,808	14,166	7,335	32,634
Cost of all materials and supplies used.....	12,000	6,552	16,991	55,964	75,155	17,585	69,486	253,733
Royalties paid.....				643	2,277	16,962	1,850	21,732
(Municipal.....)		304		1,633	183	431	558	3,109
Taxes: Provincial.....	54	103	370	2,056	666		21,193	5,442
Federal.....		556		550	2,682	5,017	40	8,845
All other sundry expenses.....	3,226	5,018	11,584	89,081	52,145	11,446	37,068	209,568
Total.....	15,316	12,533	32,065	155,096	135,916	65,607	118,530	535,063
<i>In 1922—</i>								
Total.....	33,588	25,972	54,041	49,627	28,506	50,155	59,223	301,112

¹Includes actinolite, barytes, chromite, corundum, magnesium sulphate, manganese, pyrites, sodium sulphate, and tripolite.

STRUCTURAL MATERIALS AND CLAY PRODUCTS

CEMENT

In 1922, Portland cement was the only variety produced in Canada. The essential elements entering into the production of this commodity are lime, silica and alumina. These materials are found in limestone and clay; the Trenton variety of limestone being used principally. Puzzolan cement made from blast furnace slag by one company in Nova Scotia, was manufactured in 1921 and in former years, but there was no production reported in the year under review.

Six companies, operating 11 plants with a total daily capacity of 35,338 barrels, were active during 1922. These plants were located in Quebec, Ontario, Manitoba, Alberta and British Columbia. In addition to these, there were at least twelve other cement mills equipped and available for the manufacture of this product.

No data regarding the distribution of ownership in this industry were collected in the current year. According to statistics compiled for 1921, the cement industry is controlled almost entirely by Canadian capital. Of the total par value of all securities issued, approximately 86.5 per cent was owned in Canada; 10.6 per cent in Great Britain, 1.9 per cent in United States, and the balance in other countries.

Table 306.—Principal Statistics of the Cement Industry in Canada, 1920-1922

Year	Number of Plants	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		\$		\$	\$	\$	\$
1920.....	13	44,941,686	2,301	3,757,641	3,457,796	1,738,152	14,798,070
1921.....	14	49,160,180	2,751	3,443,884	2,788,820	2,602,029	14,195,143
1922.....	11	41,573,737	1,753	2,315,240	2,457,456	2,976,152	15,438,481

Table 307.—Capital Employed in the Cement Industry in Canada, 1921 and 1922

Capital employed as represented by	1921	1922
	\$	\$
Cost of lands, buildings and fixtures.....	31,893,101	35,930,486
Cost of machinery and tools.....	4,741,607	
Cost of materials and supplies on hand.....	10,027,533	2,920,895
Cash, trading and operating accounts and bills receivable.....	2,497,939	2,722,356
Total.....	49,160,180	41,573,737

Table 308.—Employees, Salaries and Wages Paid in the Cement Industry in Canada, 1921 and 1922

Classes of Employees	1921		1922	
	Number of Employees	Salaries and Wages	Number of Employees	Salaries and Wages
		\$		\$
Officers, superintendents and managers.....	48	226,443	23	91,932
Clerks, stenographers and other salaried employees.....	295	503,715	86	125,526
Wage-earners.....	2,408	2,713,726	1,644	2,097,782
Total.....	2,751	3,443,884	1,753	2,315,240

Table 309.—Number of Wage-earners in the Cement Industry in Canada, by Months, 1922

Month	Number	Month	Number
January.....	1,002	July.....	1,843
February.....	1,109	August.....	1,842
March.....	1,185	September.....	1,934
April.....	1,448	October.....	1,922
May.....	1,755	November.....	1,907
June.....	1,860	December.....	1,719
Average for 1922.....			1,644
Average for 1921.....			2,408

Table 310.—Miscellaneous Expenses in the Cement Industry in Canada, 1921 and 1922

	1921	1922
	\$	
Rent of offices, works and machinery.....	7,540	Individual items not available
Cost of purchased power.....	559,966	
Insurance (premium for the year only).....	238,091	
Taxes (municipal, provincial and federal).....	182,086	
Royalties, use of patents, etc.....	48,050	
Advertising expenses.....	88,135	
Travelling expenses.....	17,210	
Repairs to buildings and machinery.....	556,789	
All other sundry expenses (not elsewhere specified).....	904,162	
Total.....	2,602,029	\$ 2,976,152

CLAY PRODUCTS

The production of clay products in Canada for the past three years has been tabulated in considerable detail in another section of this report, and the object of this description is a consideration of the statistics regarding the more important financial aspects and the general conditions of the industry.

The clay products industry was divided into five main groups as follows: brick and tile, clay sewer pipe, fire brick and fireclay, stoneware and pottery, and kaolin and other clays. The numbers and location by provinces of the different plants for 1921 and 1922 are shown in the subjoined tables.

There was an increase of 12 in the number of active plants throughout the Dominion during 1922, all of which were producers of brick and tile, and located in the province of Ontario. The increase in building and construction throughout Canada in general and Ontario in particular would account for this gain.

Capital employed, as represented by the value of lands, buildings, fixtures, machinery and tools, finished stocks on hand and available cash, for the whole clay products industry was greater by about \$2,600,000 than in the preceding year, practically the whole of the gain being in the brick and tile section. The capital employed by firms in the firebrick, stoneware and kaolin industries increased slightly, while a small decrease was observed in the capital of the clay sewer-pipe establishments. The changes, however, were small and are indicative of the gradual and sure development in this industry.

The principal fuel employed was bituminous coal, and as most brick plants are located in the neighbourhood of large industrial centres, the industry is largely dependent on imported coal, though wood is used by many of the smaller plants in outlying parts.

Table 311.—Principal Statistics of the Clay Products* Industry in Canada, 1922

	Brick and Tile	Clay Sewer Pipe	Firebrick and Fireclay	Stoneware and Pottery
Number of active plants.....	216	5	5	4
Capital employed.....	\$ 23,821,180	\$ 3,057,149	\$ 1,705,753	\$ 280,467
Salaries employees.....	309	34	17	8
Salaries paid.....	\$ 529,867	\$ 114,290	\$ 45,916	\$ 12,970
Average number of wage-earners.....	3,595	414	165	104
Wages paid.....	\$ 3,252,474	\$ 433,121	\$ 218,632	\$ 111,605
Fuel cost.....	\$ 1,644,463	\$ 217,228	\$ 82,228	\$ 12,652
Miscellaneous expenses.....	\$ 2,112,790	\$ 282,705	\$ 53,015	\$ 22,010
Value of products sold or used.....	\$ 8,911,539	\$ 1,571,464	\$ 633,266	\$ 252,889

* Not including Kaolin and Other Clays.

Table 312.—Establishments reporting Shipments in the Clay Products Industry in Canada, by Provinces, 1922

Province	Number of Establishments in Groups Indicated					Total
	Brick and Tile	Clay Sewer Pipe	Firebrick and Fireclay	Stoneware and Pottery	Kaolin and Other Clays	
Nova Scotia.....	7	1	1		1	10
Prince Edward Island.....	1					1
New Brunswick.....	5			1		6
Quebec.....	17	1	1		1	20
Ontario.....	145	3	2	2		155
Manitoba.....	6					6
Saskatchewan.....	8					8
Alberta.....	13		1	1		15
British Columbia.....	11					11
Canada.....	216	5	5	4	2	232

Table 313.—Capital Employed in the Clay Products Industry in Canada, by Provinces, 1921 and 1922

	1921				1922			
	Lands, buildings plant machinery and tools	Cost of supplies and products on hand	Cash, trading and operating accounts	Total	Lands, buildings plant machinery and tools	Cost of supplies and products on hand	Cash, trading and operating accounts	Total
	\$	\$	\$	\$	\$	\$	\$	\$
<i>Brick and tile—</i>								
Nova Scotia.....	1,057,750	33,176	81,296	1,172,222	1,081,795	42,750	38,276	1,162,821
New Brunswick.....	59,240	12,025	3,006	74,271	109,246	5,349	3,046	117,641
Quebec.....	6,115,038	386,377	183,918	6,685,333	6,126,526	403,693	269,995	6,800,214
Ontario.....	7,298,113	1,037,204	727,505	9,062,822	9,695,211	961,639	1,097,042	11,753,892
Manitoba.....	526,028	134,333	61,245	721,606	257,462	103,622	45,719	406,803
Saskatchewan.....	888,626	74,005	24,646	987,277	690,218	130,283	12,967	833,468
Alberta.....	1,183,702	214,889	53,974	1,452,565	1,002,618	190,199	47,468	1,240,285
British Columbia.....	723,555	120,266	138,198	982,019	960,759	194,749	350,548	1,506,056
Total for Canada.....	17,852,052	2,012,275	1,273,788	21,138,115	19,923,825	2,032,284	1,865,061	23,821,180
<i>Clay sewer pipe—</i>								
Total for Canada.....	2,524,430	530,738	121,868	3,177,036	2,435,980	440,763	180,406	3,057,149
<i>Firebrick and fireclay products—</i>								
Total for Canada.....	1,287,240	218,357	137,525	1,643,122	1,086,356	200,317	419,080	1,705,753
<i>Stoneware and pottery—</i>								
Total for Canada.....	138,990	67,587	68,688	275,265	135,464	77,260	67,743	280,467
<i>Kaolin and other clays—</i>								
Total for Canada.....	2,276,462	2,880	3,048	2,282,390	2,300,698	1,919	1,737	2,304,354
<i>Total for clay and clay products—</i>								
Nova Scotia.....	1,565,317	133,924	89,288	1,788,529	1,585,050	109,687	40,932	1,735,669
New Brunswick.....	73,271	24,379	8,649	106,299	123,277	17,703	8,639	149,669
Quebec.....	9,070,703	520,717	226,080	9,817,500	9,102,627	525,158	524,377	10,152,162
Ontario.....	9,509,785	1,416,459	917,809	11,844,053	11,806,012	1,283,658	1,273,662	14,363,332
Manitoba.....	526,028	134,333	61,245	721,606	257,462	103,622	45,719	406,803
Saskatchewan.....	888,626	74,005	24,646	987,277	690,218	130,283	12,967	833,468
Alberta.....	1,721,889	407,754	139,002	2,268,645	1,356,928	387,683	277,133	2,021,744
British Columbia.....	723,555	120,266	138,198	982,019	960,759	194,749	350,548	1,506,056
Canada.....	24,079,174	2,831,837	1,604,917	28,515,928	25,882,333	2,752,543	2,534,027	31,168,903

Table 314.—Employees, Salaries and Wages in the Clay Products Industry in Canada 1921 and 1922

	1921				1922			
	Number			Salaries and Wages	Number			Salaries and Wages
	Male	Female	Total		Male	Female	Total	
				\$				\$
SALARIED EMPLOYEES—								
Salaried officers of Corporation...	77	3	80	216,996	107	1	108	259,663
General superintendents or managers.....	90		90	208,259	128		128	291,216
Technical experts, engineers, chemists, accountants, etc.....	30	1	31	52,095	17		17	26,520
Clerks, stenographers, salesmen and other salaried employees.....	65	22	87	105,410	83	34	117	130,444
Total.....	262	26	288	582,760	335	35	370	707,843
WAGE-EARNERS—Total.....	4,080	38	4,118	3,187,493	4,269	42	4,311	4,044,498
Grand total.....	4,342	64	4,406	3,770,253	4,604	77	4,681	4,752,341

Table 315.—Number of Wage-earners in the Clay Products Industry in Canada, by Months and by Industries, 1922

Month	Brick and Tile	Clay Sewer Pipe	Firebrick and Fireclay	Stoneware and Pottery	Kaolin and Other Clays	Total for Clay and Clay Products
January.....	1,426	336	135	99	27	2,023
February.....	1,046	363	130	99	27	2,265
March.....	2,111	389	137	105	27	2,769
April.....	2,589	389	175	110	27	3,290
May.....	3,064	419	181	108	27	4,339
June.....	4,135	442	179	100	27	4,883
July.....	4,279	435	189	95	27	5,045
August.....	4,163	439	191	105	27	4,925
September.....	3,921	426	172	104	27	4,650
October.....	3,472	439	172	112	27	4,222
November.....	2,899	435	174	107	32	3,647
December.....	2,420	434	147	104	34	3,139
Average*.....	3,595	414	165	104	33	4,311

* Average computed by totalling the average number of wage-earners employed by each reporting company.

Table 316.—Miscellaneous Expenses in the Clay Products Industry in Canada, by Provinces, 1921 and 1922

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$	\$
<i>In 1921—</i>									
Rent of offices, works and machinery.....		200	3,594	32,820	15,126	530	84,700	2,015	138,985
Cost of purchased power.....			41,929	89,879	2,703		4,710	10,810	150,031
Insurance premium (for the year only).....	5,821	560	29,289	61,609	5,619	4,818	11,837	10,849	139,402
Taxes—Municipal.....	2,754	514	5,489	58,633	5,843	1,299	9,107	2,322	85,961
Provincial.....	1,873	50	2,492	13,626		1,141	1,692	3,423	24,297
Federal.....	3,239	780	6,655	40,494	1,157	348	9,821	3,114	65,608
Royalties, use of patents, etc.....				8,663		1,308	1,150	4,487	15,608
Advertising expenses.....		447	2,979	16,215	739	1,240	3,119	2,892	27,631
Travelling expenses.....	2,539	50	8,570	14,405	581	2,106	13,487	5,697	47,435
Repairs to buildings and machinery.....	12,415	2,850	85,765	216,111	6,099	11,185	18,467	34,280	387,172
All other sundry expenses.....	9,675	280	71,916	410,587	10,756	7,226	37,453	29,426	577,319
Total.....	38,316	5,731	258,678	963,042	48,623	31,201	195,543	109,315	1,650,449
<i>In 1922—</i>									
Total.....	128,268	10,875	730,141	1,451,496	14,821	12,261	80,992	58,856	2,487,710

LIME BURNING

The greatest development in Canada in the business of lime burning has been in Ontario and to a less extent in Quebec. Apart from the fact that the chemical and physical properties of the limestone in these provinces make it suitable for burning in kilns, the more extensive building and construction operations in these provinces provide a ready market for the burned lime. In the whole of Canada during 1922, there were 63 producing firms, 31 plants being located in Ontario, 17 in Quebec, 5 in New Brunswick, 4 in Manitoba, 3 in Alberta and 3 in British Columbia.

The total capital employed as reported by the operators, including the value of lands, buildings, fixtures and machinery, etc., and the working capital, showed a slight decline from the preceding year, but still approximated five million dollars in all. While Ontario and Quebec with 48 plants reported only \$2,766,202, capital employed, the 3 plants in the province of British Columbia showed \$1,188,046 under this item.

In the manufacture of lime, fuel is one of the principal items of cost. Wood fuel was widely used throughout Ontario and Quebec where the supply is plentiful and where many of the kilns are small, but considerable quantities of coal were also used. In the British Columbia plants, wood only was used. No radical change in the methods of firing in 1922 was reported; the fuel costs, however, were considerably higher in 1922 than in 1921.

Table 317.—Principal Statistics of the Lime Industry in Canada, 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		\$		\$	\$	\$	\$
1920.....	58	(a)	1,069	1,314,186	(a)	(a)	3,818,553
1921.....	66	4,990,969	931	949,966	698,992	407,620	2,781,197
1922.....	63	4,984,910	1,110	1,013,486	725,168	522,222	3,165,005

(a) Data not available.

Table 318.—Capital Employed in the Lime Industry in Canada, by Provinces, 1922

Capital employed as represented by	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, machinery and tools.....	161,860	877,132	1,294,868	496,281	191,155	1,094,262	4,115,558
Cost of materials and supplies on hand.....	46,153	90,920	129,988	29,430	6,750	60,549	363,790
Cash, trading and operating accounts and bills receivable.....	72,979	131,430	241,864	3,858	22,196	33,235	505,562
Total.....	280,992	1,099,482	1,666,720	529,569	220,101	1,188,046	4,984,910

Table 319.—Employees, Salaries and Wages in the Lime Industry in Canada, by Provinces, 1922

Occupation	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
SALARIED EMPLOYEES:—							
Salaried officers of corporation—							
Male.....	5	3	13	1	1	2	25
Female.....			1				1
Salary.....	\$ 6,650	\$ 11,000	\$ 31,374	\$ 1,800	\$ 2,000	\$ 3,900	\$ 56,724
Superintendents and managers—							
Male.....	1	7	11	2	2	4	27
Salary.....	\$ 1,500	\$ 16,612	\$ 20,632	\$ 3,720	\$ 3,700	\$ 13,385	\$ 59,549
Technical experts, engineers, chemists, accountants, etc.—							
Male.....	1	1	1	1			4
Salary.....	\$ 1,500	\$ 1,800	\$ 900	\$ 1,800			\$ 6,000
Clerks, stenographers, salesmen—							
Male.....	3	6	3	2		2	16
Female.....	1	2	7			3	13
Salary.....	\$ 4,000	\$ 7,303	\$ 6,761	\$ 2,400		\$ 8,880	\$ 29,344
Total—							
Male.....	10	17	28	6	3	8	72
Female.....	1	2	9			3	15
Salary.....	\$ 13,650	\$ 36,715	\$ 59,667	\$ 9,720	\$ 5,700	\$ 26,165	\$ 151,617
WAGE-EARNERS—							
Total—							
Male.....	87	246	441	77	22	145	1,018
Female.....		4	1				5
Wages.....	\$ 62,673	\$ 198,321	\$ 408,731	\$ 51,850	\$ 15,921	\$ 124,373	\$ 861,869
Total Employees.....	98	269	479	83	25	156	1,110
Total Salaries and Wages.....	\$ 76,323	\$ 235,036	\$ 468,398	\$ 61,570	\$ 21,821	\$ 150,538	\$1,013,486

Table 320.—Number of Wage-earners in the Lime Industry in Canada, by Provinces and by Months, 1922

Month	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
January.....	60	196	282	45	5	101	689
February.....	63	221	294	58	5	105	746
March.....	87	222	559	73	11	96	1,048
April.....	101	207	348	77	14	110	857
May.....	96	243	405	73	22	137	976
June.....	96	250	443	98	23	167	1,077
July.....	91	233	432	96	24	156	1,032
August.....	94	253	429	87	17	159	1,039
September.....	89	245	454	86	12	146	1,032
October.....	89	256	490	78	12	144	1,069
November.....	103	244	493	79	13	161	1,093
December.....	80	193	467	66	11	134	951
Average.....	87	250	442	77	22	145	1,023

Table 321.—Miscellaneous Expenses in the Lime Industry, in Canada, by Provinces, 1921 and 1922

	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$
<i>In 1921—</i>							
Rent of offices, works and machinery.....	56	4,230	4,641	2,381		204	11,512
Cost of purchased power.....	145	9,131	11,886	251		6,635	28,048
Insurance (premium for one year only).....	2,617	6,802	4,687	3,178	215		17,499
Taxes—							
Municipal.....	232	4,457	4,902	1,802	156		11,549
Provincial.....		1,126	2,304		11	2,440	5,881
Federal.....	13	4,959	1,342		459	4,338	11,091
Royalties, use of patents, etc.....		419	1,769			125	2,313
Advertising expenses.....	75	220	1,459			570	2,324
Travelling expenses.....	125	1,021	3,665	9,209	1,562	3,447	19,029
Repairs to buildings and machinery.....	2,863	40,575	35,109	3,730	2,707	7,877	92,861
All other sundry expenses.....	26,079	61,217	106,580	6,923	4,283	431	205,513
Total.....	32,275	134,137	178,344	27,474	9,393	26,067	407,620
<i>In 1922—</i>							
Total.....	22,879	125,068	282,951	19,950	16,975	53,399	522,222

SAND AND GRAVEL

For statistical purposes, the sand and gravel industry has been divided into two parts comprising the operations of (1) railway companies producing sand and gravel for ballast and other purposes; (2) all other producers.

The railway companies which produce their own gravel for ballasting purposes from company-owned pits usually assign nominal values based on the actual cost of production which are not at all comparable with the output values reported by sand and gravel companies supplying the different consuming industries. In 1922, the figures of production were, railway companies, 4,990,559 cubic yards valued at \$1,130,886; and other operators, 3,651,148 cubic yards valued at \$2,372,049.

The figures given in the following tables do not include the operations of railway companies except where specifically mentioned. The railway companies were not asked to furnish any statistics for this industry other than the figures for production, as, owing to the varied nature of their operations, it would have been impossible for them to give the detailed data generally required. Among the other operating plants in this industry, of which there were 289, in Canada in 1922, it was often found that the production of sand and gravel was quite a subsidiary part of the business transacted. On this account the figures shown for capital employed in 1922 refer in small part to other industries, but on the whole relate as closely as possible to the industry under review. No figures for capital invested were compiled for the year 1921.

It will be readily apparent from an inspection of the tables on salaried officials that totals do not represent the actual number of persons engaged in the industry as a great many of the smaller operators had no paid help. Also, in some instances the labour was provided by those requiring sand and gravel. The following tables which show comparative figures for salaried officials, wage earners, fuel costs and miscellaneous expenses are self-explanatory.

Table 322.—Principal Statistics of the Sand and Gravel Industry in Canada, 1920-1922

Year	Number of Firms	Capital employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		\$		\$	\$	\$	\$
1920.....	186	(a)	1,546	1,343,212	(a)	(a)	4,291,067
1921.....	218	(a)	590	454,910	47,641	265,403	2,537,249
1922.....	342	4,093,928	750	684,626	99,069	445,222	3,502,935

(a) Data not available.

Table 323.—Capital Employed in the Sand and Gravel Industry by Provinces, 1922

Capital employed as represented by:	Nova Scotia	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, plant, machinery and tools.....	22,107	309,258	2,302,482	292,701	39,750	182,898	496,703	3,645,899
Cost of supplies and products on hand.....	1,000	4,474	89,891	8,083	.....	.....	1,084	104,532
Cash, trading and operating accounts.....	6,832	6,991	231,302	76,540	.....	1,165	25,667	348,497
Total.....	29,939	320,723	2,623,675	377,324	39,750	184,063	523,454	4,098,928

Table 324.—Employees, Salaries and Wages in the Sand and Gravel Industry in Canada, by Provinces, 1921 and 1922

Province	1921				1922			
	Number of Employees			Salaries and Wages	Number of Employees			Salaries and Wages
	On Salary	On Wages	Total		On Salary	On Wages	Total	
				\$				\$
Nova Scotia.....	2	23	25	9,679	3	31	34	17,670
New Brunswick.....	.....	11	11	1,221	.....	12	12	2,549
Quebec.....	7	39	46	35,202	8	84	92	50,416
Ontario.....	36	307	343	294,101	69	404	473	449,869
Manitoba.....	1	24	25	20,769	7	40	47	57,426
Saskatchewan.....	7	120	127	22,992	.....	7	7	5,292
Alberta.....	3	30	33	12,669	2	30	32	18,181
British Columbia.....	9	36	45	58,277	9	44	53	83,223
Canada.....	65	599	655	454,910	98	652	750	684,626

Table 325.—Number of Wage-earners in the Sand and Gravel Industry in Canada, by Months and by Provinces, 1922

Month	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
January.....	21	11	37	167	7	1	.....	38	282
February.....	16	11	40	156	7	1	1	39	271
March.....	15	1	53	185	6	1	1	39	301
April.....	26	1	84	268	37	7	1	42	466
May.....	26	2	84	329	44	7	37	46	575
June.....	30	2	90	360	43	7	17	47	596
July.....	27	2	89	387	44	7	9	48	613
August.....	26	2	105	366	42	7	40	47	635
September.....	26	1	90	396	39	7	33	47	639
October.....	25	1	99	378	39	7	36	57	642
November.....	24	1	89	340	39	7	35	47	582
December.....	16	1	52	243	13	1	1	45	372
Average.....	31	12	84	404	40	7	30	44	652

Table 326.—Miscellaneous Expenses in the Sand and Gravel Industry in Canada, by Provinces, 1921 and 1922

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$	\$
<i>In 1921—</i>									
Cost of purchased power.....				12,341				5,400	17,741
Cost of all materials and supplies used in the pit.....		87	2,227	68,102	14,872	500	3,987	19,169	108,944
Royalties paid.....	120			24,006	1,291	1,804			27,221
Taxes—									
Municipal.....	31		255	5,553	410		304		6,553
Provincial.....			89	1,146			66	662	1,963
Federal.....			513	3,455	720	125			4,813
All other sundry expenses.....	1,226		6,613	72,147	1,256	615	10,811	5,500	98,168
Total.....	1,377	87	9,697	186,750	18,549	3,044	15,168	30,731	265,403
<i>In 1922—</i>									
Total.....	4,595	201	20,773	309,954	53,579	3,051	14,292	38,777	445,222

STONE

Operations in the stone-quarrying industry in Canada in 1922 were carried on by 162 firms. By provinces, the number of producers was as follows: Nova Scotia, 10; New Brunswick, 9; Quebec, 54; Ontario, 73; Manitoba, 2; Alberta, 1; and British Columbia, 13. During the year under review 103 deposits of limestone; 48 granite; 1 marble; 8 sandstone and 2 of slate were operated.

The statistics collected under mineral production for the stone industry are confined to quarrying operations and stone-dressing works conducted in conjunction with the quarry. It must, of course, be borne in mind when reviewing the tabulated statistics for this industry that there is a considerable quantity of stone quarried by farmers, etc., for local foundation and concrete work, of which no accurate general information can be obtained.

Table 327.—Principal Statistics relating to the Stone Quarrying Industry in Canada, 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		\$		\$	\$	\$	\$
1920.....	168	(a)	3,487	3,302,253	(a)	(a)	7,580,351
1921.....	145	11,138,035	2,067	2,017,272	141,442	2,369,130	6,343,696
1922.....	162	13,004,233	2,849	2,673,241	167,139	1,259,552	5,989,864

(a) Data not available.

Table 328.—Capital Employed in the Stone Quarrying Industry in Canada, by Provinces, 1921 and 1922

Province	1921				1922			
	Capital represented by			Total	Capital represented by			Total
	Cost of lands, buildings, plant machinery and tools	Cost of supplies and stock on hand	Cash, trading and operating accounts and bills receivable		Cost of lands, buildings, plant machinery and tools	Cost of supplies and stock on hand	Cash, trading and operating accounts and bills receivable	
	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	1,180,113	137,648	57,752	1,375,513	1,089,519	31,277	7,333	1,128,129
New Brunswick...	107,593	32,227	30,568	170,388	68,160	6,908	4,212	79,280
Quebec.....	3,652,611	183,981	281,998	4,118,590	4,269,234	278,080	694,900	5,242,214
Ontario.....	3,976,992	219,658	310,827	4,507,477	5,144,976	239,651	582,593	5,967,220
Manitoba.....	607,457	60,000	.....	667,457	154,820	1,000	20,000	175,820
Alberta.....	5,000	50	600	5,650	1,800	100	300	2,200
British Columbia..	270,782	6,490	15,688	292,960	330,814	12,832	65,724	409,370
Canada.....	9,800,548	640,054	697,433	11,138,035	11,059,323	569,848	1,375,062	13,004,233

Table 329.—Employees, Salaries and Wages in the Stone Quarrying Industry in Canada, by Provinces, 1922

Occupation	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	British Columbia	Canada
SALARIED EMPLOYEES—							
Superintendents and managers.....	No. 5 Salaries \$ 5,900	No. 7 \$ 7,864	No. 60 \$ 129,833	No. 45 \$ 103,327	No. 2 \$ 3,414	No. 9 \$ 22,341	No. 128 \$ 272,679
Technical employees.....	No. 4 Salaries \$ 1,343	No. \$	No. 12 \$ 21,815	No. 7 \$ 8,427	No. \$	No. \$	No. 23 \$ 31,583
Clerks, stenographers, etc.....	No. 3 Salaries \$ 1,390	No. \$	No. 31 \$ 30,086	No. 22 \$ 20,269	No. 2 \$ 1,546	No. 1 \$ 240	No. 59 \$ 53,531
Total.....	No. 12 Salaries \$ 8,633	No. 7 \$ 7,864	No. 103 \$ 181,73	No. 74 \$ 132,023	No. 4 \$ 4,960	No. 10 \$ 22,581	No. 210 \$ 357,795
WAGE-EARNERS	No. 124 Wages \$ 56,624	No. 74 \$ 47,172	No. 1,376 \$ 1,184,817	No. 846 \$ 800,694	No. 61 \$ 47,467	No. 163 \$ 174,194	No. 2,649 \$ 2,315,416
Total—Employees Salaries and wages.....	136 \$ 65,257	81 \$ 55,036	1,479 \$ 1,366,551	920 \$ 932,717	65 \$ 52,427	173 \$ 196,775	*2,859 \$ 2,673,241

* Includes 5 wage-earners receiving \$4,478 in Alberta.

Table 330.—Miscellaneous Expenses Incurred in the Stone Quarrying Industry in Canada, by Provinces, 1921 and 1922

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$
<i>In 1921—</i>								
Cost of purchased power.....	2,525	8,000	69,783	74,861	4,548		651	160,368
Cost of all materials or supplies used in the quarry.....	16,367		198,889	371,029	3,751	1,640	34,058	625,734
Royalties paid.....	553	471	27,081	3,349		150	2,323	33,927
Taxes—Municipal.....	1,138	268	7,240	8,085	2,023	11	32	18,797
Provincial.....	794	61	3,184	7,146	282	91	1,030	12,588
Federal.....	4,339		2,049	13,827			1,363	21,578
All other sundry expenses.....	13,102	4,321	124,770	1,344,006	2,749	1,113	6,077	1,496,138
Total.....	38,818	13,121	432,996	1,822,303	13,353	3,005	45,534	2,369,130
<i>In 1922—</i>								
Total.....	34,777	11,716	590,347	566,760	11,042	204	44,706	1,259,552

PART THREE

DIRECTORY

In the following pages the names and addresses of all the principal operators in the Canadian mineral industry are given, and the location of the properties worked in 1922 is also shown.

METALLIC MINERAL INDUSTRIES

The Auriferous Quartz Mining Industry

Name of Operator	Address	Name of Mine	Location of Mine
NOVA SCOTIA			
*Bradford Mines, Ltd.	20 Broad St., New York	Bradford	Halifax Co.
Hilchey Mining Co.	Cariboo Gold Mines	Hall and Hilchey	Halifax Co.
*Malaga Gold Mines	Malaga	Malaga	Queens Co.
Sherbrooke Mines and Power Co.	Goldenville	Sherbrooke	Guys Co.
Six individual lessees and prospectors.			
ONTARIO			
<i>Kirkland Lake Area—</i>			
*Bidgood Gold Mines, Ltd.	Haileybury	Bidgood	Lebel Tp.
*Canadian Kirkland Gold Mining Co.	Haileybury	Canadian Kirkland	Teck Tp.
*Continental Mines, Ltd.	Sudbury		Lebel Tp.
*Goodfish Gold Mines, Ltd.	Kirkland Lake	Goodfish	Morrisette Tp.
*Harvey Kirkland Mines, Ltd.	Kirkland Lake	Harvey Kirkland	Lebel Tp.
*Huntton Kirkland Gold Mines, Ltd.	Haileybury		Kirkland Lake
*King Kirkland Gold Mines, Ltd.	Toronto, 33 Richmond St. W.	King Kirkland	Lebel Tp.
*Kirkland Gateway Gold Mines, Ltd.	Swastika	Kirkland Gateway	Teck Tp.
*Kirkland Lake Gold Mining Co., Ltd.	Toronto, 816 Lumsden Bldg.	Kirkland Lake	"
Kirkland Lake Proprietary (1919), Ltd.	Kirkland Lake	(Tough Oakes.	"
Lake Shore Mines, Ltd.	Kirkland Lake	Burnside	Lebel Tp.
Montreal Ontario Gold Mines, Ltd.	Kirkland Lake	Lake Shore	Teck Tp.
*Queen-Lebel Gold Mines, Ltd.	Kitchener	Queen Lebel	Lebel Tp.
Teck Hughes Gold Mines, Ltd.	Kirkland Lake	Teck Hughes	Lebel Tp.
Wright-Hargreaves Mines, Ltd.	Bridgeburg	Wright-Hargreaves	Teck Tp.
<i>Larder Lake Area—</i>			
*Argonaut Gold, Ltd.	Dane	Argonaut	Gauthier Tp.
*Crown Reserve Mining Co., Ltd.	Larder Lake	Pancake	Larder Lake
<i>Lightning River Area—</i>			
*Blue Quartz Gold Mines, Ltd.	Toronto	Blue Quartz	Painkiller Lake
*Hattie Gold Mines, Ltd.	Matheson, P.O.	Hattie	Coulson Tp.
*Lightning River Gold Mines	Kirkland Lake	Lightning River	Holloway Tp.
<i>Northwestern Ontario Area—</i>			
*Contact Bay Mines, Ltd.	Toronto, 120 Bay St.	Contact Bay	Van Horn Tp.
*Goudreau Gold Mines	Toronto	Goudreau	Algoma Dist.
*Grace Mining Co., Ltd.	Fort Erie	Grace	Eagle Lake.
*Jackson Development Co.	Port Arthur	Jackson	Nipigon
<i>Porcupine Area—</i>			
*Beaumont Gold Mines, Ltd.	Toronto, 1601 Royal Bank Bldg	Beaumont	Tisdale Tp.
*Canadian Gold Mines Corporation	Timmins		"
Clifton Porcupine Mines, Ltd.	South Porcupine	Clifton	Deloro Tp.
Dome Mines Company, Ltd.	South Porcupine	Dome	Tisdale Tp.
*Hayden Gold Mines Co., Ltd.	Buffalo	Hayden	Deloro Tp.
Hollinger Consolidated Gold Mines, Ltd.	Timmins	Hollinger	Tisdale Tp.
*Kerr Lake Mining Co., Ltd.	Cobalt	Goldale	"
*March Gold, Ltd.	South Porcupine	March Gold	Deloro Tp.
McIntyre Porcupine Mines, Ltd.	Toronto, 602 Standard Bank Bldg.	McIntyre	Tisdale Tp.
*Night Hawk Peninsula Mines, Ltd.	Connaught Station	Night Hawk	Cody Tp.
*North Crown Porcupine Mines, Ltd.	Larder Lake	North Crown	Tisdale Tp.
*Porcupine Davidson Gold Mines, Ltd.	Toronto, 4-5 King Edward Hotel	Davidson	Tisdale Tp.
Porcupine Paymaster Mines, Ltd.	South Porcupine	Paymaster	Deloro Tp.
*Vipond Consolidated Mines, Ltd.	Timmins	Vipond	Tisdale Tp.
<i>Southern Ontario—</i>			
*Cobalt Frontenac Mining Co.	Flinton	Cobalt	Kaladar Tp.
*Ore Chimney Mining Co.	Northbrook	Ore Chimney	Barrie Tp.
<i>Sudbury Area—</i>			
*Buckingham Mines, Ltd.	West Shining Tree	Buckingham	Asquith Tp.
*Ribble Mines, Ltd.	Toronto, 404 C.P.R. Bldg.	Wasapika	Shining Tree
White Rock Mining Co., Ltd.	Sudbury	White Rock	MacMurchy Tp.
MANITOBA			
*Bingo Gold Mines, Ltd.	Winnipeg	Bingo	Pas Dist.
Stewart and Papineau	Winnipeg	Kingfisher	Rice Lake.

* Operating but not shipping.

The Auriferous Quartz Mining Industry—Concluded

Name of Operator	Address	Name of Mine	Location
BRITISH COLUMBIA			
*Bullock Gold Mines, Ltd.	Poplar Creek	Bullock	Poplar Creek
California Mining Co., Ltd.	Spokane, Wash.	California	Nelson
*Carmi Gold Mining Co.	Carmi	Carmi	Yale
*Fairview Mining Co.	Fairview	Susie	Yale
Golskiesh Mines, Ltd.	Vancouver	Golskiesh	Nass River
Hedley Gold Mining Co., Ltd.	Hedley	Nickel Plate	Similkameen
I. X. L. Mining and Milling Co.	Kimberley	I. X. L.	Rossland
Jeremaison, D., and Anderson, A.	Vancouver	Esperanza	Nass River
Johnson, Ole, and Co.	Chu Chua	Windpass	Yale
Kitelas Mountain Copper Co., Ltd.	Usk	Cordillera	Omineca
Liberator Mining Co., Ltd.	Vancouver	Emancipation	Yale
*MacKinnon, Margaret D.	Rossland	Golden Drip	Kootenay
McKay, James, and Bibeau, C.	Stewart	Lake View	Portland Canal
McLellan, J.	Queen Charlotte	Early Bird	Queen Charlotte
Nugget Gold Mines Ltd.	Vancouver	Nugget	Salmo
Patterson, F.	Refuge Bay	Patterson	Coast District
*Paxton, D. C.	Lillooet	Wayside	Lillooet District
Pioneer Gold Mines, Ltd.	Vancouver	Pioneer	Lillooet District
Premier Gold Mining Co., Ltd.	Premier	Premier	Skeena
*Texas Yankee Girl Mining Co.	Ymir	Yankee Girl	Kootenay

* Operating but not shipping.

The Copper-Gold-Silver Mining Industry

Name of Operator	Address	Name of Mine	Location
QUEBEC			
Eustis Mining Company	Eustis	Eustis	Ascot
ONTARIO			
Algmont Mines, Ltd.	18 Toronto St., Toronto	Algmont	Rose Tp.
BRITISH COLUMBIA			
Belmont Surf Inlet Mines, Ltd.	Surf Inlet	Surf Inlet	Skeena District, Queen Charlotte
Consolidated Mining & Smelting Co. of Canada, Ltd.	Rossland	Rossland Group	West Kootenay, Nelson Division
Federal Mining & Smelting Co. (Lasqueti Mining Co.)	Telkwa	Venus	Lasqueti Sound, Nanaimo Division
*Gabbro Copper Mines, Ltd.	415 Sayward Bldg., Victoria	Gabbro	Jordan River District, Victoria Division
Granby Consolidated Mining, Smelting and Power Co., Ltd.	Anyox	Hidden Creek Group	Observatory Inlet, Nass Division
Kamloops Copper Co.	Duluth, Minn.	Iron Mask	Kamloops Division
*Kickbush, F. C.	Chilliwack	Empire	Lillooet District
*Kleanza Co., Ltd.	Usk	(Kleanza Group)	Skeena, Omineca Div'n.
		(Valhalla Group)	
Le Roi No. 2, Ltd.	Rossland	Le Roi No. 2 Group	West Kootenay, Nelson Division
McDaniels, M.	Nelson	Mountain Chief	Lower Arrow Lake, Slo-can Division
Maid of Erin Silver Mining Co., Ltd.	Haines, Alaska	Maid of Erin	Rainy Hollow, Atlin Division
*Maple Leaf Mines, Ltd.	Grand Forks	Maple Leaf	Grand Forks, Atlin Div.
*Molly Gibson Burnt Basin Mining Co., Ltd.	Box 107, Rossland	Molly Gibson	" " "
Osborne and Howard	Tulameen	Spokane	Tulameen
Silverado Mining Co.	Stewart	Silverado Group	Bear River, Portland Canal Division
Tidewater Copper Co.	619 Alaska Bldg., Seattle, Wash.	Indian Chief	Sidney Inlet, Clayoquot Division
*Woodworth, J. B.	Thorley Park, Vancouver	Alaska	Vancouver

* Operating but not shipping.

The Silver-Cobalt Mining Industry

Name of Operator	Address	Name of Mine	Location
ONTARIO			
*Alpine Silver Mines, Ltd.	Haileybury	Alpine	Gowganda
Bailey Silver Mines, Ltd.	134 King St. E., Toronto	Bailey	Cobalt
Canadian Lorrain Silver Mines, Ltd.	Haileybury	Canadian Lorrain	South Lorrain
Canadian Casey Cobalt Mining Co., Ltd.	1512 Bank of Hamilton Bldg., Toronto	Casey	Casey Tp.
*Cane Silver Mines, Ltd.	New Liskeard	Cane	Cane Tp.
*Casey Mountain Operating Syndicate, Ltd.	Judge	Casey Mountain	Casey Tp.
Cobalt Silver Queen, Ltd.	Cobalt	Silver Queen	Coleman Tp.
Coniagas Mines, Ltd.	50 Ontario St., St. Catharines	/ Coniagas	"
		Tretheway	"
Crown Reserve Mining Co., Ltd.	Larder Lake	Crown Reserve	"
*Dickson Creek (Cobalt) Silver Mines, Ltd.	Haileybury	Dickson Creek	Bucke Tp.
Dominion Reduction Co., Ltd.	Cobalt	Dominion	Coleman Tp.
*Genesee Mining Co., Ltd.	Cobalt	Genesee	"
Hermo Mining Co., Ltd.	Cobalt	Reliance	"
Islet Exploration Co., Ltd.	509 Allworth Bldg., Duluth, Minn.	Silver Islet	Sibley Tp.
Keeley Silver Mines, Ltd.	Haileybury	Keeley	South Lorrain
*Kerr Lake Mining Co., Ltd.	Cobalt	Kerr Lake	Coleman Tp.
La Rose Mines, Ltd.	Cobalt	La Rose	"
Lorrain Operating Co.	Toronto, 1512 Bank of Hamilton Bldg.	Haileybury-Frontier	South Lorrain
McKinley-Darragh-Savage Mines of Cobalt, Ltd.	Cobalt	McKinley-Darragh-Savage	Coleman Tp.
*Menago Mining Co., Ltd.	Sudbury	Colonial	"
Mining Corporation of Canada, Ltd.	1512 Bank of Hamilton Bldg., Toronto	/ Buffalo	"
		Townsite	"
		City of Cobalt	"
		Townsite Extension	"
Nipissing Mining Co., Ltd.	Cobalt	Nipissing	"
O'Brien, M. J., Ltd.	Cobalt	O'Brien	"
*Oxford Cobalt Silver Mines, Ltd.	Woodstock	Miller-Lake-O'Brien	Gowganda
Tretheway Silver-Cobalt Mines, Ltd.	Standard Bank Bldg., Toronto	Oxford Cobalt	Gillies
*Victory Silver Mines, Ltd.	Box 261, St. Catharines	Castle	Gowganda
		Victory	Coleman Tp.

* Operating but not shipping.

The Silver-Lead-Zinc Industry

ONTARIO			
Kingdon Mining, Smelting and Manufacturing Co., Ltd.	Galetta	Kingdon	Galetta
BRITISH COLUMBIA			
Ainsworth Mining Division—			
Burgess, W. H.	Kaslo	Whitewater	Retallack
Consolidated Mining & Smelting Co. of Canada, Ltd.	Rossland	Highland	Ainsworth
*Cork-Province Mines, Ltd.	Kaslo	Cork-Province	Zwicky
Florence Silver Mining Co., Ltd. (D. E. Sanders)	518 Sutton Blk., Spokane, Wash.	Florence	Ainsworth
Foulkes, G. and Roberts	Kaslo	Dublin	Zwicky
Giegerich, H.	Kaslo	Silver Hoard	Ainsworth
Grant and Peterson (lessees)	Ainsworth	Number One	"
Hansen, Thos. B.	Nashton	Black Bear	Kaslo Creek
*Henry and Currie	Ainsworth	Violet	Woodberry Creek
*Lake Shore Mining Co.	Ainsworth	Lake Shore	Ainsworth
McCready, G. E.	Zincton	Caledonia	Blaylock
McDougall, James	Ainsworth	Spokane-Trinket	Ainsworth
		Neosho	Ainsworth
New Canadian Metal Co., Ltd. (S. S. Fowler)	Riondel	Blue Bell	Riondel
*Shepherd Mining Co.	Kaslo	Kirby	Ainsworth
Thompson, J. H. (lessee)	New Denver	Lincoln	Blaylock
Utica Mines, Ltd. (T. R. French)	Kaslo	Utica	Adamant
Atlin Mining Division—			
Atlin Silver-Lead Mines (J. M. Ruffner)	Atlin	Cherokee & Barber	Atlin
Cariboo Mining Division—			
*North Point Mining Co.	Prince George	Atlas	Fort George
Fort Steele Mining Division—			
Consolidated Mining and Smelting Co. of Canada, Ltd.	Kimberley	Sullivan	Kimberley
*Guindon Mining & Milling Co.	Moyie	Guindon	Moyie
Golden and Windermere Division—			
Bruce, R. Randolph	Invermere	Paradise	Toby Creek
MacPhail, J. R.	525 Seymour St., Vancouver	Monarch	Field

* Operating but not shipping.

The Silver-Lead-Zinc Industry—Concluded

Name of Operator	Address	Name of Mine	Location
BRITISH COLUMBIA—Concluded			
<i>Grand Forks Mining Division—</i>			
Williams, Wm.	Edgewood	First Chance	Lightning Peak
<i>Greenwood Mining Division—</i>			
Barrett, G. M.	Beaverdell	Revenge Group	Beaverdell
Drum, James	Greenwood	Twin	Greenwood
Duhamel, J. H.	Box 543, Greenwood	Ethiopia	"
*Jack Paul Mining Co.	610 Hutton Blk. Spokane, Wash.	Riverside	"
McKeller and Hallett	Greenwood	Highland Lass	Wallace Mountain
Morrison and McGillis	Greenwood	Tam O'Shanter	Deadwood Camp
Paton, J. N. (McIntosh & Crane)	Beaverdell	Bell	Wallace Mountain
Rambo, W. H.	Beaverdell	Standard Fraction	Wallace Mountain
Sutherland, James	Beaverdell	Rob. Roy & Castor Fraction	Beaverdell
Wallace Mountain Mines, Ltd.	Box 176, Penticton	Sally Group	"
<i>Nelson and Arrow Lake Mining Divisions—</i>			
Consolidated Mining and Smelting Co. of Canada, Ltd. (to lessee)	Trail	Molly Gibson	Kokanee Creek
*Forster, H. E.	Wilmer	Millie Mack	Cariboo Creek
Turner, W. J.	Salmo	Emerald	Salmo
	Salmo	Silver Dollar	"
Wolverton, R. W.	Cascade	Granite-Poorman	Taghum
<i>Omineca Mining Division—</i>			
*Duthie, J. F. (John R. Turner)	Smithers	Mamie	Hudson Bay Mtn.
Silver Standard Mining Co.	506 Winch Bldg., Vancouver	Silver Standard	Hazelton
<i>Portland Canal Mining Division—</i>			
*American Mining & Milling Co.	470 Granville St., Vancouver	Betty & Sullivan Group	Salmon River
Young, A. E.	Stewart	Sunshine	Glacier Creek
<i>Slocan and Slocan City Mining Divisions—</i>			
Byrne, M. J.	Sandon	Gem	Carpenter Creek
Cartwright, C. E.	502 North West Bldg., Vancouver	Black Prince & Two Friends	Lemon
Clarke & Mavin	Sandon	Carnation	Sandon
Clever, H.	New Denver	Mollie Hughes	New Denver
Cunning, R.	Sandon	Last Chance	London Ridge
Cunningham, C.	Alamo	Alamo, Eureka Hewitt, Idaho, Queen Bess, Richmond, Sovereign, Wonderful	Alamo
Dunsmuir & Sons (Paul Lincoln)	Sandon	Noble Five	Sandon
Edwards, Frank	New Denver	Mountain Chief, Mammoth	New Denver
Harris and Kelly	Sandon	Number One	Sandon
Hedley, R. R.	Slocan	Arlington	Springer Creek
Johnson and Kirk	Sandon	Mountain Con.	Sandon
Long and Buchanan	Slocan	Meteor	Slocan
Long, G.	Sandon	Lilly B.	Springer Creek
MacAuley & McFarlane	Sandon	Metallie	Slocan
		Fayne	Sandon
		Ore-Bin	"
Noonday Mines Co.	Box 1772, Spokane, Wash.	Noonday	Sandon
O'Neill, D. B.	Slocan	L. T. Group	Slocan
Ottawa Mining & Milling Co.	Slocan	Ottawa	"
Rambler-Cariboo Mines, Ltd. (W. A. Cameron)	New Denver	Rambler-Cariboo	Three Forks
Rosbery-Surprise Mining Co., Ltd.	New Denver	Bosun	New Denver
Rosbery-Surprise Mining Co., Ltd.	(Lessees)	(Monitor)	Three Forks
		(Surprise)	Sandon
Silversmith Mines, Ltd.	Box 1772, Spokane, Wash.	Silversmith	Sandon
Slocan Silver Mines, Ltd.	Alamo	McAllister	Three Forks
*Soho Consolidated Mines, Ltd.	Spokane, Wash.	Soho	Carpenter Creek
Standard Silver-Lead Mining Co.	Silverton	Standard	Silverton
Sunderland, J. B.	Vancouver	Ruth	Sandon
Wafer, Barker and Maurer	Slocan City	Hampton	Springer Creek
Zimmerman, Kurt	Slocan City	Anna	Springer Creek
<i>Trail Creek, Trout Lake, Revelstoke & Lardau Mining Divisions—</i>			
Lanark Mining Co.	Illecillewaet	Lanark	Illecillewaet
*Multiplex Mining Co.	Box 436, Revelstoke	Multiplex	Camborne
*Silver Crown Mining Co.	426 Rookery Bldg., Spokane, Wash.	Ethel	Trout Lake
*True Fissure Mining Co.	229E. 6th St. Cincinnati, Ohio	True Fissure	Ferguson
YUKON			
Keno Hill, Ltd.	120 Broadway, New York	Keno Hill	Keno Hill, Mayo Division
Treadwell Yukon Co., Ltd.	Crocker Bldg., San Francisco, Cal.	Ladue	" "

*Operating but not shipping.

NOTE.—Ontario reported only one company which is included among the shippers given above, and all Quebec lead-zinc mines were reported idle.

In the Yukon Territory development operations were carried on by many individual operators and by a few incorporated companies in the Keno Hill area.

NON-METALLIC MINERAL INDUSTRIES

Actinolite Mining Industry

Name	Address	Location
The Actinolite Mining Co., Ltd.....	Bloomfield, N.J.....	Kaladar Township, Ont.

Asbestos Mining Industry

Name	Address	Name of Mine	Location of Mine
QUEBEC—			
Asbestos Corporation of Canada, Ltd.	Canada Cement Bldg., Montreal.....	King.....	Thetford Tp.
		Beaver.....	Coleraine Tp.
		British Canadian.....	
		Fraser.....	Broughton Tp.
Asbestos Mines, Ltd.....	282 St. Catherine St., Montreal	Boston.....	Broughton Tp.
Bell Asbestos Mines.....	Thetford Mines.....	Bell.....	Thetford Tp.
Bennett-Martin Asbestos and Chrome Mines, Ltd.....	Thetford Mines.....	Vimy Ridge.....	Ireland Tp.
		Thetford.....	Thetford Tp.
Black Lake Asbestos and Chrome Co., Ltd.....	282 St. Catherine St., Montreal	Union.....	Coleraine Tp.
		Imperial.....	Coleraine Tp.
		Southward.....	Coleraine Tp.
Canadian Johns-Manville Co., Ltd.....	450 St. James St., Montreal.....	Jeffrey.....	Shipton Tp.
Consolidated Asbestos, Ltd.....	145 St. James St., Montreal.....	Thetford.....	Thetford Tp.
Federal Asbestos Co.....	145 St. James St., Montreal.....	Federal.....	Thetford Tp.
Johnson's Company.....	Thetford Mines.....	Johnson's.....	Thetford Tp.
		Johnson's.....	Coleraine Tp.
Maple Leaf Asbestos Corp., Ltd.....	Thetford Mines.....	Maple Leaf.....	Coleraine Tp.
Pennington Asbestos Co.....	Thetford Mines.....	Pennington.....	Thetford Tp.
Quebec Asbestos Corporation.....	East Broughton.....	Quebec.....	Broughton Tp.

Barytes Mining Industry

Name	Address	Location
Brandram-Henderson, Ltd.....	Montreal, P.Q.....	Lake Ainslie, Inverness County, N.S.

The Coal Mining Industry*

Name of Operator	Address	Location of Mine
		<i>District</i>
NOVA SCOTIA—		
Acadia Coal Co.....	New Glasgow.....	Pictou.
Anglo Coal Co., Ltd.....	Box 100, Glace Bay.....	Cape Breton.
Athol Coal Co., Ltd. (formerly Export Coal Co.).....	Box 754, New Glasgow.....	Cumberland.
Bras d'Or Coal Co.....	Little Bras d'Or Bridge.....	Cape Breton.
Carter Coal Co.....	Box 68, Amherst.....	Cumberland.
Dominion Coal Co.*.....	Sydney.....	Cape Breton.
Emerson Coal Co., Ltd.....	16 Rupert St., Amherst.....	Cumberland.
Fundy Mining Co.....	49 Gottingen St., Halifax.....	Cumberland.
Greenwood Coal Co.....	Thorburn.....	Pictou.
Indian Cove Coal Co.....	Sydney Mines.....	Cape Breton.
Intercolonial Coal Mg. Co., Ltd.....	Westville.....	Pictou.
Inverness Ry. & Collieries, Ltd.....	Inverness.....	Inverness.
Maritime Coal, Ry. & Power Co., Ltd.....	Joggins Mines.....	Cumberland.
Minudie Coal Co., Ltd.....	River Hebert.....	Cumberland.
Nova Scotia Steel and Coal Co.....	New Glasgow.....	Cape Breton.
Prendegast, Denis (formerly Port Hood Collieries).....	Port Hood.....	Inverness.
Provincial Mining Co. (Twin Seam Coal Co.).....	Maecan.....	Cumberland.
River Hebert Coal Co., Ltd. (formerly Marsh Mine).....	River Hebert.....	Cumberland.
Sterling Coal Co.....	River Hebert.....	Cumberland.
		<i>County</i>
NEW BRUNSWICK—		
Avon Coal Co., Ltd.....	Box 940, St. John.....	Queens.
McDougal Bros.....	Minto.....	Queens.
Minto Coal Co., Ltd.....	Minto.....	Queens.
Miramichi Lumber Co.....	Minto.....	Queens.
Reade, L. W., c/o Grand Lake Coal Co.....	768 Brunswick St., Fredericton.....	Queens.
Rothwell Coal Co., Ltd.....	Rothwell.....	Queens.
Welton, Harvey & Wood.....	Minto.....	Queens.
Welton & Henderson.....	Minto.....	Queens.
		<i>Municipality</i>
SASKATCHEWAN—		
Bienfait Commercial Co., Ltd.....	Bienfait.....	Near Bienfait.
Bienfait Mine.....	Bienfait.....	Near Bienfait.
Crescent Collieries, Ltd.....	Bienfait.....	Near Bienfait.

*Operators producing 500 tons or over per month.

The Coal Mining Industry—Continued

Name of Operator	Address	Location of Mine
SASKATCHEWAN—Concluded		
Estevan Coal and Brick Co., Ltd.	Estevan.	Estevan.
Manitoba and Sask. Coal Co., Ltd.	503 Avenue Blk., Winnipeg, Man.	Bienfait.
Nicholson, H.	Estevan.	Estevan.
Shand Coal and Brick Co., Ltd.	Shand.	Shand.
Western Dominion Collieries, Ltd.	305 Trust and Loan Bldg., Winnipeg, Man.	Taylorston.
Western Collieries, Ltd.	Roche Percee.	Roche Percee.
ALBERTA—		
<i>Anthracite—</i>		
Canadian Pacific Railway (Bankhead Mine).	Department of Natural Resources, Calgary.	District Banff.
<i>Bituminous—</i>		
Alexo Coal Mining Co., Ltd.	Saunders.	Brazeau.
Balkan Coal Co., Ltd.	Coalspur.	Yellowhead Pass.
Blackstone Coal Co., Ltd.	Blackstone Mine.	Yellowhead Pass.
Ballarai & Sobotin.		
Vitlay Coal Co., Ltd.		
Stupor, Oakley & Co.		
Blue Diamond Coal Co., Ltd.	Brule Mines.	Jasper Park.
Brazeau Collieries, Ltd.	Nordeg.	Brazeau.
Cadomin Coal Co., Ltd.	282 Main St., Winnipeg, Man.	Mountain Park.
Canmore Coal Co., Ltd.	Canmore.	Canmore.
Coal Valley Mining Co., Ltd.	Coal Valley.	Yellowhead Pass.
Foothills Collieries, Ltd.	Lovettsville.	Yellowhead Pass.
Harlech Coal Co.	Nordeg.	Brazeau.
Hillcrest Collieries, Ltd.	Hillcrest.	Crow's Nest Pass.
International Coal and Coke Co., Ltd.	Coleman.	Crow's Nest Pass.
Luscar Collieries, Ltd.	Mountain Park.	Mountain Park.
McGillivray Creek Coal & Coke Co.	Coleman.	Crow's Nest Pass.
McLeod River Hard Coal Co., Ltd.	Coalspur.	Yellowhead Pass.
Mohawk Bituminous Mines, Ltd.	Bellevue.	Crow's Nest Pass.
Mountain Park Coal Co., Ltd.	708 Tegler Bldg., Edmonton.	Mountain Park.
Sterling Collieries, Ltd. (formerly Oliphant-Munson)	509 Tegler Bldg., Edmonton.	Yellowhead Pass.
Saunders Alberta Collieries, Ltd.	Saunders, via Rocky Mountain House.	Brazeau.
Saunders Creek Collieries, Ltd.	Saunders.	Brazeau.
West Canadian Collieries, Ltd.	Blairmore.	Crow's Nest Pass.
Yellowhead Coal Co.	Coalspur.	Yellowhead Pass.
<i>Lignite—</i>		
Alberta Block Coal Co., Ltd.	Drumheller.	Drumheller.
Alberta Coal Mining Co., Ltd.	Bank of Montreal Bldg., Edmonton.	Cardiff.
Anderson, William John.	Sheerness.	Hanna.
Atlas Coal Co., Ltd.	Drumheller.	Drumheller.
Banner Coal Co., Ltd.	121 Adam's Block, Edmonton.	Cardiff.
Big Valley Collieries.	Box 34, Big Valley.	Big Valley.
Bish Bros. & Le Gear.	Forestburg.	Battle River.
Blackfoot Indian Agency.	Gleichen.	Brooks.
Bush Mine Coal Co., Ltd.	Box 161, Beverley.	Clover Bar.
Callie Coal Co., from April 1, 1921 (formerly The Drumheller Land Co., Ltd.)	Drumheller.	Drumheller.
Canada West Coal Co., Ltd.	Taber.	Taber.
Canadian Dinant Coal Co.	Dinant.	Camrose.
Canadian Pacific Railway Co.	Department of Natural Resources, Calgary.	Lethbridge, Taber.
Carbon Coal Co.	Box 166, Carbon.	Carbon.
Carbon Stopp Mining Co. (formerly International Construction & Mfg. Co.)	Box 178, Carbon.	Carbon.
Cardiff Collieries, Ltd., The.	Cardiff.	Cardiff.
Celtic Coal Co. (formerly Hamilton Coal Co.)	Wayne.	Drumheller.
Chinook Coal Co., Ltd.	117 Sherlock Blk., Lethbridge.	Lethbridge.
City of Lethbridge Coal Mine.	Lethbridge.	Lethbridge.
Clover Bar Coal Mine Co., Ltd.	Box 180, Beverley.	Clover Bar.
Crown Coal Co. (Penn. Mine Coal Co.)	1351-82nd Street, Edmonton.	Edmonton.
Daly Mine.	Clover Bar.	Clover Bar.
Dawson Coal Co., Ltd.	6 McDougall Court, Edmonton.	Edmonton.
Dobell Coal Co., Ltd.	Box 140, Tofield.	Tofield.
Donaldson & Tennant (formerly Federal Coals)	Box 628, Lethbridge.	Lethbridge.
Edmonton Collieries, Ltd.	Fraser Flats, 92nd St., Edmonton.	Edmonton.
Elcin Coal Co., Ltd.	Drumheller.	Drumheller.
Ellis Coal Co., Ltd.	Box 46, Three Hills.	Three Hills.
Excelsior Collieries, Ltd.	Wayne.	Drumheller.
Fraser-Mackay Collieries, Ltd.	10055-101 St, Edmonton.	Clover Bar.
Gibson Collieries, The.	Box 29, Drumheller.	Drumheller.
Great West Coal Co., Ltd. (Black Diamond Mine).	10026-101 "A", Edmonton.	Clover Bar.
Great West Coal Co., Ltd. (The Star Mine).	Aerial.	Drumheller.
Humberstone Coal Co., Ltd.	Box 506, Beverley.	Clover Bay.
Hy-Grade Coal Co., Ltd.	Drumheller.	Drumheller.
Ideal Coal Co., Ltd.	407-1st E., Calgary.	Drumheller.
Jewel Collieries, The.	Wayne.	Drumheller.
Keith and Fulton.	Clover Bar.	Clover Bar.
Kelly, Mrs. E. (formerly Namao Collieries, Ltd.)	Namao.	Namao.
Kleenbirm Collieries, Ltd.	Eyremore.	Brooks.
Lakeside Coals, Ltd.	711 Tegler Bldg., Edmonton.	Wabamun.
Lethbridge Coal Co., Ltd.	Lethbridge.	Lethbridge.
McPeak, P. J.	112th Ave., & 76th St., Edmonton.	Edmonton.
Marcus Collieries, Ltd.	Clover Bar.	Clover Bar.
Marzoli & Co. (formerly Miller, Smith & Miller)	Rosedale Station.	Drumheller.

The Coal Mining Industry—Concluded

Name of Operator	Address	Location
ALBERTA—Concluded		
<i>Lignite—Concluded</i>		
Midland Collieries, Ltd.	Midlandvale	Drumheller.
Mid-West Collieries, Ltd.	Box 387, Drumheller	Drumheller.
Moonlight Coal Co., Ltd.	Rosedale Station	Drumheller.
North American Collieries, Ltd.	McLeod Bldg., Edmonton	Drumheller, Lethbridge, Pembina and Red Deer.
North Star Coal Co. (formerly Tredway Coal Co.)	Cardiff	Cardiff.
Newcastle Coal Co., Ltd.	Drumheller	Drumheller.
Newcastle Junior Mfg. Co., Ltd.	Drumheller	Drumheller.
Oscar Collieries, Ltd.	Sheerness	Hanna.
Ostwell, R. P. Coal Mine	Clover Bar	Clover Bar.
Oliphant, John	Medicine Hat	Medicine Hat.
Palisade Coal Co., Ltd. (formerly Blue Gem Collieries, Ltd.)	Three Hills	Three Hills.
Parker Creek Collieries, Ltd.	1011 Herald Bldg., Calgary	Trochu.
Peerless Carbon Coal, Ltd.	Carbon	Carbon.
Premier Coal Co., Ltd.	Drumheller	Drumheller.
Reed & Brown	74th Street, Edmonton	Edmonton.
Redcliff Brick and Coal Co., Ltd.	Redcliff	Medicine Hat.
Regal Collieries, Ltd.	Taber	Taber.
Rock Springs Coal Co.	Taber	Taber.
Rosedale Coal Co., Ltd.	Rosedale	Drumheller.
Rose Deer Coal Mining Co., Ltd.	Wayne	Drumheller.
Round Hill Collieries, Ltd., The	Round Hill	Camrose.
Scranton Coal Co., Ltd.	Drumheller	Drumheller.
Sheffield Collieries, Ltd.	Wayne	Drumheller.
Spicer Coal Co., Ltd.	Dinant	Camrose.
Stoney Creek Collieries, Ltd.	Camrose	Camrose.
Sunshine Coal Co., Ltd.	Wayne	Drumheller.
Tofield Coal Co., Ltd.	Tofield	Tofield.
Western Commercial Co.	Wayne	Drumheller.
Western Gem Mining Co., Ltd.	Drumheller	Drumheller.
BRITISH COLUMBIA—		
Canadian Collieries (Dunsmuir)	600 Belmont Bldg., Victoria	Comox } District Wellington } Island
Coalmont Collieries, Ltd.	205 Yorkshire Bldg., Vancouver	Inland.
Corbin Coal & Coke Co., Ltd.	Corbin	Crows Nest.
Crows Nest Pass Coal Co., Ltd.	Fernie	Crows Nest.
Fleming Coal Co., Ltd.	Merritt	Inland.
Granby Cons. Mfg. S. & P. Co.	Cassidy, Vancouver Island	Inland.
Middlesboro Collieries, Ltd.	Middlesboro	Inland.
Nanosee Wellington Coal Co.	Wellington	Inland.
Princeton Coal & Land Co., Ltd.	Princeton	Inland.
Western Fuel Corporation of Canada	Nanaimo	Inland.

The Feldspar Industry

MINES—		
QUEBEC—		
Buckingham Feldspar Company*	Buckingham	Derry Tp.
Cameron, J. J.	Box 11, Buckingham	Buckingham Tp.
Couture Bros.	Glen Almond	Buckingham Tp.
Gowan, William	Holland Mills	Portland Tp.
McMillan, A. J.	Buckingham	Buckingham Tp.
O'Brien and Fowler	Bk. of Nova Scotia Bldg., Ottawa, Ont.	Derry Tp.
Pednaud, G.	Glen Almond	Buckingham Tp.
Winning, Bush	N.D. de Salette	Portland Tp.
ONTARIO—		
Canadian Non-Metallic Minerals, Ltd.	Aylen Lake	Dickens Tp.
Campbell, A. M.	Box 30, Perth	Bathurst Tp.
Cleveland Feldspar and Products Co.	327 Union Bldg., Cleveland, Ohio, U.S.A.	Monteagle Tp.
Dillon and Mills	Hartington	Loughboro Tp.
Federal Feldspar, Limited	250 Slater St., Ottawa	Bedford Tp.
Feldspars, Limited	293 Bay St., Toronto	Bedford, Portland and Loughboro Tps.
Feldspar Mines, Corp., Ltd.	Toronto	Monteagle Tp.
Feldspar Quarries, Limited	60 Front St. E., Toronto	Portland Tp.
Industrial Minerals Corporation of Canada, Ltd.	805 Bank of Hamilton Bldg., Tor- onto	Monmouth Tp.
McPhee Bros.	Wanapitei	Dryden Tp.
Orser-Kraft Feldspar, Ltd.	563 William St., Buffalo, N.Y., U.S.A.	Bathurst Tp.
Orser and Wilson	Perth	Loughboro Tp.
Rock Products Company	Nicholas Bldg., Toledo, Ohio, U.S.A.	Bathurst Tp.
Treadwell, W. C.	Hartington	Loughboro Tp.
Verona Mining Company	404 Harrison Bldg., Philadelphia, Pa.	Monteagle Tp.
MILLS—		
Feldspar Milling Co., Limited	33 Richmond St. W., Toronto	Toronto, Ont.
Frontenac Floor and Wall Tile Co., Ltd.	Kingston	Kingston, Ont.

*Sold to Mahoney and Rich, 88 Bank St., Ottawa, on August 10, 1922.

The Fluorspar Industry

Name	Address	Location
ONTARIO—		
Cross and Wellington.....	Madoc.....	Huntingdon Township.
Mineral Products, Ltd.....	Madoc.....	Madoc Township.
Wallbridge G. M.....	Madoc.....	Madoc Township.
BRITISH COLUMBIA—		
Consolidated Mining & Smelting Co. of Canada, Ltd..	Trail, B.C.....	Grand Forks Division.

The Graphite Industry

QUEBEC—		
Quebec Graphite Co., Ltd.....	4 Fenchurch, London, E.C.....	Lochaber Township
Standard Graphite Co., Ltd.....	228 Sherbrooke St., Montreal.....	Boyer Township.
ONTARIO—		
Black Donald Graphite Co., Ltd.....	Calabogie, Ont.....	Brougham Township,

The Grindstone Industry

NOVA SCOTIA—		
Mic-Mac Grindstone Co., Ltd.....	Woodburn.....	Woodburn.
NEW BRUNSWICK—		
The Miramichi Quarry Co., Ltd.....	Quarryville.....	Quarryville.
The Read Stone Co., Ltd.....	Sackville.....	Stonehaven.

The Gypsum Industry

NOVA SCOTIA—		
Iona Gypsum Products Co.....	Iona, C.B.....	Iona.
Newark Plaster Co.....	Newark, New Jersey.....	Ottawa Brook, Victoria Co.
Rock Plaster Corp.....	40 Rector St., New York, N.Y.....	Walton, Hants Co.
Wentworth Gypsum Co., Ltd.....	Windsor.....	Wentworth, Hants Co.
Windsor Gypsum Co.....	Newburgh, N.Y.....	Windsor, Hants Co.
Windsor Plaster Co., Ltd.....	Windsor.....	Windsor, Hants Co.
NEW BRUNSWICK—		
Albert Manufacturing Co.....	Hillsborough.....	Hillsborough, Albert Co.
Hillsborough Plaster, Quarrying and Manufacturing Co.....	Hillsborough.....	Edgetts Landing, Albert Co.
ONTARIO—		
The Ontario Gypsum Co., Ltd.....	Paris.....	Caledonia, Seneca Tp. Lythmore, Oneida Tp.
MANITOBA—		
Manitoba Gypsum Co., Ltd.....	Winnipeg.....	Gypsumville.
BRITISH COLUMBIA—		
Hammond, W. H.....	Ashcroft.....	Lillooet district.
The Soda Mining & Products Co., Ltd.....	12 Bank of Hamilton Bldg., Vancouver.....	Lillooet district.

The Iron Oxide Mining Industry

QUEBEC—		
Argall, Thos. H.....	Three Rivers.....	Point du Lac, St. Maurice Co.
Canada Paint Co., Ltd.....	572 William St., Montreal.....	Red Mill, Champlain Co.
Champlain Oxide Co.....	Three Rivers.....	Champlain, Champlain Co.
BRITISH COLUMBIA—		
McDonald, R. W.....	323 Fifth Ave. West, Calgary, Alta.	Windermere District, B.C.

The Magnesite Industry

QUEBEC—		
International Magnesite Co., Ltd.....	1005 Bank of N.S. Bldg., Montreal	Harrington Township.
North American Magnesite Products, Ltd.....	127 Board of Trade Bldg., Montreal	Grenville Township.
Scottish Canadian Magnesite Co.....	Montreal, Que.....	Grenville Township.

The Magnesium Sulphate Mining Industry

Basque Chemical Production Co., Ltd.....	349 Railway St., Vancouver, B.C.....	Basque, B.C. (near Ashcroft)
--	--------------------------------------	------------------------------

The Manganese Mining Industry

Name	Address	Location
Consolidated Manganese Co.....	Portland, Maine, U.S.A.....	New Ross, Lunenburg Co., N.S.

The Mica Industry

QUEBEC—		
Ahearn, W. A.....	538 McLaren St., Ottawa, Ont.....	Hull Tp.
Argall, W. A.....	Laurel.....	
Blackburn Bros.....	134 Wellington St., Ottawa, Ont.....	Templeton Tp.
Burns, John.....	High Falls.....	Portland West.
Cheslock, Isidore.....	High Falls.....	Portland West.
Flynn, H. T.....	106-8 Montcalm St., Hull.....	Hull Tp.
Gauthier and Gibault.....	Buckingham.....	Portland Tp.
Gowan, Wm.....	Holland Mills.....	Portland West Tp.
Laurentide Mica Co., Ltd.....	119 Queen St. West, Ottawa, Ont.....	East Templeton Tp.
McGlashan Mining Syndicate.....	Cantley.....	
O'Brien and Fowler.....	Bank of Nova Scotia Bldg., Ottawa, Ont.....	Portland and Templeton Tp.
Sherbrooke-Saguenay Mica, Ltd.....	139 King St. W., Sherbrooke.....	Bergeronnes Tp.
Watts, Edward.....	Dodds Lake.....	Portland West, Que.
Winning, Bush.....	Notre Dame de la Salette.....	Portland Tp.
ONTARIO—		
Bennett, H. B.....	Perth.....	Loughborough Tp.
Kent Bros. and Estate J. M. Stoness.....	Kingston.....	Bedford Tp.
Martin, A. G.....	231 Besserer St., Ottawa.....	Loughborough Tp.
The Loughborough Mining Co., Ltd.....	Sydenham.....	Loughborough Tp.
Tory Hill Marble and Mica Co., Ltd.....	Tory Hill.....	Glamorgan Tp.
Wildman and Burke.....	Perth.....	Elmsley Tp.

The Natro-Alunite Mining Industry

San Juan Mining & Manufacturing Co.....	918 Government St., Victoria, B.C.	Kyuquot, Vancouver Island.
---	------------------------------------	----------------------------

The Natural Gas Industry

NEW BRUNSWICK—		
New Brunswick Gas and Oilfields, Limited.....	Box 196, Moncton.....	Stony Creek, Albert Co.
ONTARIO—		
Aldrich Gas and Oil Co., Ltd.....	Merchants' Bank Bldg., Hamilton.....	Rainham Tp.
Allen, J. D.....	Dumville.....	Moulton Tp.
Axon, Jos. J.....	Middleport.....	Onondaga Tp.
Azoff Gas Co.....	Canfield.....	North Cayuga Tp.
Barriek, Arthur E.....	Marshville.....	Wainfleet Tp.
Barriek, Oscar.....	Marshville.....	Wainfleet Tp.
Barriek, R. P. and Stouth.....	Marshville.....	Wainfleet Tp.
Battle Natural Gas Co., Ltd.....	Hamilton.....	Moulton Tp.
Beaver Oil and Gas Co., Ltd.....	518 Jackson Bldg., Buffalo, N.Y.....	Romney Tp.
Beer, Geo.....	Binbrook.....	Binbrook Tp.
Bertie Natural Gas Co., Ltd.....	Ridgeway.....	Bertie Tp.
Binbrook Gas Co.....	Binbrook.....	Binbrook Tp.
Bradley, Alex.....	R. R. 1, Lowbanks.....	Moulton Tp.
Bressett, J. E.....	Middleport.....	Onondaga Tp.
Brown, E. R. & C. A.....	Marshville.....	Wainfleet Tp.
Brown, Walter.....	Gainsville.....	Onondaga Tp.
Camby, B. F.....	R. R. 2, Marshville.....	Wainfleet Tp.
Canboro Gas & Oil Co.....	Selkirk.....	Rainham, Seneca Tp.
Canada Cement Co., Ltd.....	Montreal, Que.....	Dunn Tp.
Canfield Natural Gas Co.....	Canfield.....	Cayuga N. Tp.
Carter, Henry.....	Dunnville.....	Dunn Tp.
Castle Oil & Gas Co.....	Imperial Bank Chambers, Niagara Falls.....	Euphemia Tp.
Chippawa Development Co., Ltd.....	Chippawa.....	Willoughby Tp.
Chippawa Oil & Gas Co., Ltd.....	Tavistock.....	Caistor, Gainsboro Tp.
Clover Gas and Oil Co.....	704 Mutual Life Bldg., Buffalo, N.Y.....	Moulton Tp.
Coleman, J. A.....	Welland Port.....	Wainfleet, Gainsboro Tp.
Cowie, Alex.....	Caledonia.....	Onondaga Tp.
Darling Road Co-operative Gas Co.....	Canfield.....	Canboro, North Cayuga Tp.
Deagle and Brown.....	R. R. 2, Caledonia.....	Onodaga Tp.
Deagle, Edwin.....	Middleport.....	Onondaga Tp.
Deagle, John.....	Middleport.....	Onodaga Tp.
Dean, C. & F.....	R. R. 2, Marshville.....	Wainfleet Tp.
Dean F.....	R. R. 2, Marshville.....	Wainfleet Tp.
Diener, Eugene F.....	R. R. 5, Dunnville.....	Canboro

The Natural Gas Industry—Continued

Name	Address	Location
Dominion Natural Gas Co., Ltd.	518 Jackson Bldg., Buffalo, N.Y.	Bayham, Binbrook, Caistor Canboro, Cayuga N., Cayuga S., Charlotteville, Dunn, Dunwich, Glanford, Houghton, Malahide, Middleton, Moulton, On- eida, Onondaga, Rainham, Seneca, Walpole, Walsing- ham N., Walsingham S., Windham, Woodhouse Tps.
Dougherty, R.	Middleport.	Onondaga Tp.
Douglas, James	Caledonia.	Onondaga
Douglas, W. A.	R.R. 1, Caledonia.	Onondaga
Dunn Natural Gas Co., Ltd.	Dunnville.	Dunn, Sherbrooke Tps.
Duxbury, J. Henry	Hagersville.	Walpole Tp.
Eastside Gas Co.	R.R. 2, Lowbanks.	Sherbrooke
Ellsworth, Fletcher	Port Colborne.	Wainfleet Tp.
Emmerson, Geo.	R.R. No. 2, Dunnville.	Moulton Tp.
Emerson, Laidlaw and Troughton	R.R. 1, Attercliffe Station	Canboro Tp.
Empire Limestone Co.	19 Hudson St., Buffalo, N.Y.	Humberstone Tp.
Evans, Thos.	R.R. 1, Glanford Station.	Binbrook
Fenton, H. R.	R.R. 3, Hannon.	Barton Tp.
Fisherville Gas Co.	Fisherville.	Rainham Tp.
Fletcher, J. D.	R.R. 1, Hannon.	Binbrook
Fulton, Thos.	Cainsville.	Onondaga Tp.
Gilmore, M. W.	R.R. 2, Caledonia.	Onondaga Tp.
Glenwood Natural Gas Co., Ltd.	518 Jackson Bldg., Buffalo, N.Y.	Gosfield S., Mersea, Raleigh, Romney, Tilbury Tps.
Graybeil, Elisha.	Port Colborne.	Humberstone Tp.
Graybell, S. B.	Burnaby.	Wainfleet
Hager, Calvin.	Middleport.	Onondaga Tp.
Hager, Hamilton	Middleport.	Onondaga Tp.
Hamilton Gas and Oil Co.	17 Main St. E., Hamilton.	Seneca Tp.
Hart and Harrington.	Attercliffe Station	Canboro Tp.
Helka, Fred.	Fisherville.	Rainham Tp.
Hendee Gas Co.	Cayuga.	South Cayuga Tp.
Hoffman, Albert.	Dunnville.	Moulton Tp.
Hoover, J. E.	R.R. 1, Selkirk.	Walpole Tp.
Howell, H. H.	Cainsville.	Onondaga Tp.
Industrial Natural Gas Co., Ltd.	Thorold.	Bertie, Crowland, Humber- stone Tps.
Jasperson, B.	Kingsville.	Tilbury East Tp.
Jones, J. S.	Port Maitland.	Dunn Tp.
Kindy, D. and Son.	Selkirk.	Rainham
King, Ralph, Gas Co.	Hamilton.	Charlotteville, Middleton, Rainham, Seneca, Wal- pole Tps.
Kohl, Mrs. E.	R.R. 1, Sarnia.	Sarnia Tp.
Lalor, F. R.	Dunnville.	Moulton Tp.
Lalor and Vokes (now A. C. May)	Dunnville.	Walpole Tp.
Lamb, Alfred.	Selkirk.	Walpole Tp.
Lambert, E. C.	Lowbanks.	Moulton Tp.
McBay, John.	R.R. 3, Dunnville.	Moulton Tp.
McDonald, Mrs. J.	Canfield Junction.	N. Cayuga
McKee, Jacob.	Hannon.	Barton Tp.
Maple Leaf Gas Co.	48 St. John's Rd., Buffalo, N.Y.	Moulton Tp.
Marshall, Jas.	Hamilton.	Barton, Glanford, Seneca Tps.
Martin, E.	Port Maitland.	Dunn Tp.
Medina Natural Gas Co., Ltd.	Box 339, Chatham.	Bayham, Houghton Tp.
Michener, E. C.	Marshville.	Wainfleet Tp.
Mickle and McKechnie.	Ridgetown.	Canboro Tp.
Midfield Gas Co., Ltd.	9 Maple Ave., Hamilton.	N. Cayuga, Oneida Tp.
Moore, C. A.	Perry Station.	Wainfleet Tp.
Morrell, F.	Middleport.	Onondaga Tp.
National Gas Co., Ltd.	503 Bank of Hamilton Bldg., Ham- ilton.	Binbrook, Rainham, Seneca Tps.
Nie, Jos.	Attercliffe Station.	Moulton Tp.
Niece, Hosea and Son.	Lowbanks.	Sherbrooke Tp.
Northern Gas & Gasoline Co.	Hepworth.	Amabel Tp.
North Shore Gas Co., Ltd.	Merchants Bank Bldg., Hamilton.	Rainham Tp.
Oil Springs Oil & Gas Co., Ltd.	Oil Springs.	Enniskillen Tp.
Petrol Oil & Gas Co., Ltd.	1804-6 Royal Bank Bldg., Toronto.	Dover, West Tp.
Pilkington Bros., Ltd.	Thorold.	Crowland Tp.
Port Colborne-Welland Natural Gas and Oil Co., Ltd.	Port Colborne.	Oneida, Onondaga, Seneca Tps.
Powell, Jno. W.	Burnaby.	Wainfleet Tp.
Progressive Oil & Gas Co.	212 Main & Hughson St., Hamilton.	N. Dorchester Tp.
Provincial Natural Gas & Fuel Co., of Ontario, Ltd.	103 Queen St., Niagara Falls.	Bertie, Crowland, Humber- stone, Wainfleet, Willough- by Tp.
Richardson, J. W.	R.R. 2, Caledonia.	Seneca Tp.
Richmond Oil & Gas Co., Ltd.	Scane Bldg., Chatham.	Bayham Tp.
Sarnia Gas & Oil Co.	145½ Front St., Sarnia.	Sarnia Tp.
Shurr, Wm.	Marshville.	Wainfleet Tp.
Sparham, A. F.	Caledonia.	Glanford Tp.
Springvale Gas & Oil Co.	Hagersville.	Walpole Tp.

The Natural Gas Industry—Concluded

Name	Address	Location
Steel, G. G.	R.R. 1, Sarnia.	Sarnia Tp.
Sterling Gas Co., Ltd.	Port Colborne.	Humberstone, Moulton, Sherbrooke, Wainfleet Tps.
Stevensville Gas & Fuel Co., Ltd.	Stevensville.	Bertie Tp.
Sundy Gas & Oil Co.	Dunnville.	Canboro Tp.
Sykes, Edward.	Merlin.	Raleigh, Tp.
Tate, J. W.	R.R. 2, Cayuga.	N. Cayuga Tp.
Union Exploration Co.	Chatham.	Dawn, Dover, Tilbury E., Colchester S. Tps.
Union Natural Gas Co. of Canada, Ltd.	48½ Market St., Chatham.	Dover W., Raleigh, Romney, Tilbury E. Tps.
United Gas Companies, Ltd.	518 Jackson Bldg, Buffalo, N.Y.	Canboro, Cayuga N., Moulton, Seneca, Wainfleet. Tps.
Vacuum Oil & Gas Ltd.	509 Lumsden Bldg., Toronto.	Dover West, Middleton Tp.
Van Sickle, A. W.	Onondaga.	Onondaga
Wainfleet-Moulton Gas Co.	R.R. 1, Lowbanks.	Moulton, Wainfleet Tp.
Walker, Thomas.	R.R. 2, Caledonia.	Onondaga Tp.
Wardell, Theo.	R.R. 5, Dunnville.	Canboro Tp.
Weylie, Wm.	R.R. 2, Glanford Station.	Glanford Tp.
MANITOBA—		
Haskill, E. C.	Treherne, Box 64.	Treherne
ALBERTA—		
Alberta Clay Products Co., Ltd.	Box 672, Medicine Hat.	Medicine Hat
Canada Cement Co. Ltd.	Canada Cement Co. Bldg., Montreal, Que.	Dauntless
Canadian Pacific Ry. Co.	Montreal, Que.	Medicine Hat
Canadian Western Natural Gas, Light, Heat & Power Co., Ltd.	215-6 th Ave. West, Calgary.	Near Bow Island
		Near Barnwell, Near Dunmore, Near Brook, Near Calgary
Canadian Western Power and Fuel Co.	Redcliff.	Redcliff
Dominion Glass Co., Ltd.	285 Beaver Hall Hill, Montreal, P.Q.	Redcliff
Gas City Brick Co. Ltd.	Medicine Hat.	Medicine Hat
Hedley Shaw Milling Co., Ltd.	Medicine Hat.	Medicine Hat
Medicine Hat, Corporation of.	Medicine Hat.	Medicine Hat
Ogilvy Flour Mills Co. Ltd.	Montreal, Que.	Medicine Hat
Redcliffe Brick & Coal Co. Ltd.	Redcliff.	Redcliff
Royalite Oil Co. Ltd.	239-6th Ave.	Turner Valley
Southern Alberta Gas Co., Ltd.	Box 677, Medicine Hat.	Suffield
Town of Bow Island.	Bow Island.	Bow Island
Wetaskiwin, Corporation of.	Wetaskiwin.	Wetaskiwin
United Electric & Engineering Co. Ltd.	1721-11th St. West, Calgary.	Bassano

The Peat Industry

Peat Committee (Federal-Ontario).....	Mines Branch, Ottawa, Ont.....	Alfred, Ont.
---------------------------------------	--------------------------------	--------------

The Petroleum Industry

NEW BRUNSWICK—		
New Brunswick Oil and Gasfields, Ltd.	Box 196, Moncton.	Stony Creek, Albert Co.
ONTARIO—		
Ajax Oil and Gas Company.	509 Lumsden Bldg., Toronto.	Raleigh Tp.
Anderson Bros. & Thompson.	Oil Springs.	Enniskillen Tp.
Anderson, J. H.	Oil Springs.	"
Armstrong, J. G.	Petrolia.	"
Atkinson, John.	R.R. No. 3, Petrolia.	Plympton Tp.
Bailey, John R.	R.R. No. 3, Petrolia.	Moore Tp.
Bails, E. H.	R.R. No. 3, Petrolia.	Sarnia Tp.
Banting, Albert E.	Wyoming.	Plympton Tp.
Barrett, C. H.	Petrolia.	Enniskillen Tp.
Bothwell Oil Co., Ltd.	120 Bay St., Toronto.	Zone Tp.
Boges, M. J.	Petrolia.	Enniskillen Tp.
Bowls, J. H.	R.R. No. 3, Petrolia.	Sarnia Tp.
Braybrook, J. T.	R.R. No. 3, Petrolia.	Enniskillen Tp.
Brock, Thos. A.	Petrolia.	"
Brydges, Burt.	Petrolia.	"
Brydges, Ed. O.	R.R. No. 3, Petrolia.	"
Canada Crude Oil Products Co.	Confederation Life Bldg., Toronto.	"
Carleton, George.	R.R. No. 2, Petrolia.	"
Canadian Oil Co., Ltd.	707 Excelsior Life Bldg, Toronto.	"
Canadian Oil Producing and Refining Co., Ltd.	Petrolia.	"
Carman and Fairbank.	Petrolia.	Zone Tp.
Chester, George and Son.	R.R. No. 3, Petrolia.	Sarnia Tp.
Coulter, Jas.	Petrolia.	Moore Tp.

The Petroleum Industry—Continued

Name	Address	Location
ONTARIO—Continued—		
Crocker-Parks Oil Co., Ltd.	Oil Springs	Enniskillen Tp.
Crotty and Elliott	Bothwell	Zone Tp.
Darling, Arthur C.	Petrolia	Enniskillen Tp.
Dempsey, James	Petrolia	"
Dennis, H. S.	R.R. No. 3, Petrolia	Plympton Tp.
Donald, Geo.	Oil Springs	Enniskillen Tp.
Duncan Bros.	Petrolia	Moore Tp.
Edward, A. C., Estate	Petrolia	Enniskillen Tp.
Edward, F. H.	Petrolia	"
Elliott, Clarence H.	R.R. No. 3, Petrolia	Sarnia Tp.
Elliott, Henry C.	R.R. No. 3, Petrolia	Moore Tp.
Eureka Oil and Gas Co., Ltd.	37 Sun Life Bldg., Toronto	Raleigh Tp.
Fairbank, E. O.	Petrolia	Zone Tp.
Fairbank, J. H., Estate	R.R. No. 4, Petrolia	Enniskillen Tp.
Fowler, John H.	R.R. No. 4, Petrolia	"
Goodie, John	R.R. No. 3, Petrolia	"
Griffin, Geo.	R.R. No. 1, Sarnia	Sarnia Tp.
Hamlin, Mrs. Samuel	Box 259, Petrolia	Enniskillen Tp.
Heal, John	Corunna	Moore
Hill, James T. and Sons	Oil Springs	Enniskillen Tp.
Hoskin, John	Sarnia	Sarnia Tp.
Houston, King, Estate of	382 Richmond St., London	Enniskillen Tp.
Howlett, Fred	Box 3, Petrolia	"
Hussey, W. J.	Petrolia	"
Jewell, Dan	Oil Springs	"
Jones, C. E.	Oil Springs	"
Johnson, Thos.	Petrolia	"
Josh, John	Petrolia	"
Kerr, John, Estate	Petrolia	"
Kerr, Mrs. Ross	Petrolia	"
Kirk, Elmer	Sarnia	Moore Tp.
Kirk, John	R.R. No. 3, Petrolia	Sarnia Tp.
Lern, Chas. J.	R.R. No. 1, Sarnia	Moore Tp.
Lewis, John J.	Petrolia	Enniskillen Tp.
Logan, Herbert	Oil Springs	Sarnia Tp.
Logan, Leslie	R.R. No. 3, Petrolia	"
Lucas, Ed.	Petrolia	"
McAlpine, T. A.	Sarnia	Enniskillen Tp.
McCrie, William	R.R. No. 2, Sarnia	Sarnia Tp.
McDougall, D.	Petrolia	Enniskillen Tp.
McGillivray, Geo. A.	London	"
McKay, Jno.	Sarnia	Sarnia Tp.
McLellan, Jas.	R.R. No. 3, Petrolia	Moore Tp.
McLellan, Peter	Corunna	Moore Tp.
McPhedran, John	R.R. No. 3, Petrolia	Enniskillen Tp.
McManus, Alex.	R.R. No. 1, Wyoming	Plympton Tp.
Maitland, Jas. B.	R.R. No. 2, Sarnia	Sarnia Tp.
Maw, Frank	R.R. No. 3, Petrolia	Enniskillen Tp.
Miller, Frank J.	R.R. No. 2, Sarnia	Sarnia, Tp.
Miller, S. M.	R.R. No. 3, Petrolia	Moore Tp.
Miller, W. W.	R.R. No. 3, Petrolia	"
Montgomery, Thos.	R.R. No. 3, Petrolia	Enniskillen Tp.
Morningstar, R. B. & L. H.	Oil Springs	"
Morris, Geo.	Petrolia	"
Mott, Edward J.	Oil Springs	"
Mutual Oil Producing Co.	Box 539, London	"
Napper, Fred	Petrolia	"
Neath, Arthur	Chatham	Raleigh Tp.
Onondaga Oil and Gas Ltd.	Room 8, Temple Bldg, Brantford	Onondaga Tp.
Ontario Lands and Oil Co., Ltd.	Petrolia	Enniskillen Tp.
Ontario Petroleum Co.	Glencoe	Mosa Tp.
Osborne Oil Producers, Ltd.	Box 700, Petrolia	Moore Tp.
Parks, E. M. & W. H.	R.R. 3, Petrolia	Enniskillen Tp.
Paul, John D.	R.R. No. 1, Wyoming	Plympton Tp.
Petrol Oil and Gas Co., Ltd.	1804-6 Royal Bank Bldg., Toronto	Dover West Tp.
Porter, H. & G. S.	Petrolia	Mosa Tp.
Quillinan, J. F.	Imperial Bank Chambers, Niagara Falls	"
Rainsberry, Ed. L.	Petrolia	Sarnia Tp.
Rainsberry, Nicholas J.	R.R. No. 3, Petrolia	"
Rainsberry, Walter and Sons	Petrolia	Enniskillen Tp.
Rawson, Andrew and Sons	R.R. No. 3, Petrolia	"
Robinson, John	Box 91, Petrolia	Zone Tp.
Rowe, E. P.	292 Rushton Rd., Toronto	Sarnia Tp.
Rowe, Geo.	Corunna	"
Ruckle, Harry	Petrolia	Enniskillen Tp.
Sanson, Mrs. Carrie	Petrolia	"
Schumacher, Bowen W.	Room 1010, No. 112 West Adams St., Chicago, Ill.	"
Scott, Rodger	Petrolia	"
Smith, Thos.	R.R. No. 2, Sarnia	Sarnia Tp.
Sproule Bros.	Oil Springs	Enniskillen Tp.
Sproule and Johnston	Oil Springs	"
Storing, N.	R.R. No. 3, Petrolia	Moore Tp.
Taylor, P. V. & Co.	1031 Lumber Exchange Bldg., Chicago, Ill.	Zone Tp.

The Petroleum Industry—Concluded

Name	Address	Location
ONTARIO—Concluded		
Walker Oil and Gas of Bothwell	129 Chatham St. W., Windsor	Zone Tp.
Wallen, Alex. C.	Oil Springs	Enniskillen Tp.
Wallen, John, Estate	Oil Springs	"
Walsh, Mrs. Thos.	Oil Springs	"
Warwick, Jos.	Petrolia	"
Watt, P. J.	Oil Springs	"
Wilson, James	River & View Aves., London	"
Winnett, J. W. G.	R.R. No. 1, Sarnia	Sarnia Tp.
Woodward, J.	418½ Talbot St., London	Bothwell Tp.
Woodward, W.	Oil Springs	Enniskillen Tp.
Yerks, Carleton	Oil Springs	"
	Petrolia	"
ALBERTA—		
Canada Southern Oil and Refining Company	Black Diamond	Okotoks Oil Field.
Sheep River Oil Company	406 Grain Exchange Bldg., Calgary	Turner Valley Oil Field.
Southern Alberta Oils, Ltd.	407 Grain Exchange Bldg., Calgary	" "

The Pyrites Industry

ONTARIO—		
Grasselli Chemical Co., Ltd.	Hamilton, Ont.	Blythefield Tp.
Nichols Chemical Co., Ltd.	Montreal, Que.	"Northpines Mine," Drayton Tp.
		"Sulphide Mine," Hungerford Tp.
BRITISH COLUMBIA—		
Consolidated Mining & Smelting Co. of Canada, Ltd.	Trail B.C.	"Sullivan Mine, Kimberley.
Granby Consolidated Mining, Smelting & Power Co., Ltd.	Anyox, B.C.	"Hidden Creek," near Anyox

The Quartz Industry

QUEBEC—		
Bonell, J.	Buckingham	Buckingham Tp.
Gorman, J. B.	Buckingham	Buckingham Tp.
O'Brien & Fowler	c/o M. J. O'Brien, Ltd., Ottawa, Ont.	Derry Tp.
Pedneaud, G.	Glen Almond	Buckingham Tp.
Silico, Limited	103 St. Francois-Xavier, Montreal	Parish of St. Canut.
ONTARIO—		
Dominion Mines and Quarries, Ltd.	Canada Life Bldg., 46 King St. West, Toronto	District of Algoma. (East Neebish Quarry.)
Electro Metals, Ltd.	Welland	Killarney.
Mond Nickel Co., Ltd., The	Coniston	Neelon Tp.
Orser-Kraft Feldspar, Ltd.	Perth	Bathurst, Tp.
Wright & Co.	960 Queen St., Sault Ste. Marie	Deroche Tp.
BRITISH COLUMBIA—		
Granby Consolidated M. S. & P. Co., Ltd.	Anyox	Anyox.

The Salt Industry

NOVA SCOTIA—		
Chambers & MacKay	New Glasgow	Malagash, Cumberland Co.
ONTARIO—		
Brunner-Mond, Canada, Ltd.	Canada Bank of Commerce Bldg., Toronto	Amherstburg, Essex Co.
Canadian Salt Co., Ltd.	719 Sandwich St. W., Windsor	Windsor, Essex Co.
Exeter Salt Works, Co., Ltd.	Exeter	Exeter, Huron Co.
The Elarton Salt Work Co., Ltd.	Warwick	Watford, Lambton Co.
Western Canada Flour Mills Co., Ltd.	Goderich	Goderich, Huron Co.
The Wingham Salt Works	Wingham	Wingham, Huron Co.
The Western Salt Co., Ltd.	43 Victoria St., Toronto	Courtright, Lambton Co.
The Dominion Salt Co., Ltd.	412 N. Front St., Sarnia	N. Front St., Sarnia, Lambton Co.
The Goderich Salt Co., Ltd.	Goderich	Goderich, Huron Co.

The Sodium Carbonate Mining Industry

Name	Address	Location
Lillooet Soda Co., Ltd.....	502 North West Bldg., Vancouver, B.C.....	Lillooet.

The Sodium Sulphate Mining Industry

Bishopric and Lent Co.....	Cincinnati, Ohio, U.S.A.....	Frederick Lake, Sask.
Salts & Chemicals, Ltd.....	44 Edward St., Kitchener, Ont.....	Maskakee Lake, Sask.
Sodium Sulphate Co. of Saskatchewan, Ltd.....	1753 Rose St., Regina, Sask.....	Near Hardy, Sask.

The Talc Mining Industry

QUEBEC— Robertsonville Soapstone Quarry, Ltd.....	Robertsonville.....	Thetford Tp.
ONTARIO— Asbestos Pulp Co., Ltd.....	Belleville.....	"Connolly Mine," Huntingdon Tp.
Henderson Mines, Ltd.....	Madoc.....	"Henderson Mine," Huntingdon Tp.
Gillespie Co., Ltd., Geo. H. (Mill).....	Madoc.....	Plant at Madoc.
Wood, H. H.....	Mine Centre.....	Mine Centre.
BRITISH COLUMBIA— Eagle Talc and Mining Co.....	W. G. Dickinson, 627 Yates St., Victoria.....	Victoria Mining Division.
Canadian Talc and Silica Co.....	734 Rogers Bldg., Vancouver.	

The Tripolite Mining Industry

Oxford Tripoli Co., Ltd.....	Oxford, N.S.....	Silica Lake, N.S..
------------------------------	------------------	--------------------

STRUCTURAL MATERIALS AND CLAY PRODUCTS

The Cement Industry

Name	Address	Location
QUEBEC— Canada Cement Co., Ltd.....	Canada Cement Co. Bldg., Montreal	East Montreal Hull
ONTARIO— Canada Cement Co., Ltd.....	Canada Cement Co. Bldg., Montreal	Belleville
Hanover Cement Co., Ltd.....	Que.....	Port Colborne
St. Mary's Cement Co., Ltd.....	Hanover.....	Hanover
	49 Wellington St. E., Toronto.....	St. Mary's.
MANITOBA— Canada Cement Co., Ltd.....	Canada Cement Co. Bldg., Montreal, Que.....	Winnipeg
Commercial Cement Co., Ltd.....	918 Union Bank Bldg., Winnipeg, ...	Babcock
ALBERTA— Canada Cement Co., Ltd.....	Canada Cement Co. Bldg., Montreal, Que.....	Exshaw
Marlboro Cement Co.....	21 Dominion Bank Chambers, Ed- monton.....	Marlboro
BRITISH COLUMBIA— British Columbia Cement Co., Ltd.....	305 Belmont Bldg., Victoria.....	Bamberton

The Clay Products Industry—Brick and Tile

Name	Address	Location
NOVA SCOTIA—		
Brooks, Geo.	New Glasgow	Plymouth
Brooks, Stephen, and Sons	Box 559, New Glasgow	New Glasgow
Miller, Jas. B.	Elmsdale	Barney's Brook
Nova Scotia Clay Works, Ltd.	Elmsdale	Lantz Siding
Shaw, Ltd., L. E.	Avonport	Avonport
PRINCE EDWARD ISLAND—		
Prince Edward Island Brick and Tile Company	Summerside	Richmond
NEW BRUNSWICK—		
Loggie Co., Ltd., W. S.	Chatham	Nelson
Mooney and Sons, Ltd.	112 Queen St., St. John	Fairville
Northampton Brick Co., Ltd.	Woodstock	Northampton
Ryan and Sons, M.	Box 575, Fredericton	Fredericton, Woodstock Rd.
Tondreau, Jos. A.	Box 22B, Bathurst	Bathurst
QUEBEC—		
Alex. Mills Brick Co., The	Orms town	Orms town
Ascot Tile and Brick Co., Ltd.	Ascot Corner, Sherbrooke	Ascot Corner, Sherbrooke
Bell, W. and D.	1286 St. Valier St., Quebec	Little River Rd., Que.
Citadel Brick and Paving Block Company, Ltd.	421 St. Paul St., Quebec	Montmorency, Boischatel
Granby Clay Products, Ltd.	P.O. Box 266, Granby	Granby Tp.
George, Emile	St. Felix de Valois	St. Felix de Valois
Hodgins, David G.	Box 148, Shawville	Shawville
Laliberte, L.	Deschailions	Deschailions
La Cie de Briques de l'Abitibi	Amos	Amos
La Cie de Briques de l'Islet	L'Islet	L'Islet Station
La Cie de Briques de Matane	Matane	Matane
La Cie de Briques St. Laurent, Ltd.	71 St. James St., Montreal	Laprairie
La Cie de Tuyaux de Drainage, Ltée.	L'Islet Station	L'Islet Station
L'Industrielle de St. Tite, Ltée.	St. Tite	St. Tite
Laliberte, E.	Deschailions	Deschailions
National Brick Co. of Laprairie, Ltd.	511 St. Catherine St. W., Montreal	Delson and Laprairie
Proulx Bros.	P.O. Box 384, Richmond	Richmond
ONTARIO—		
Alvinston Brick & Tile Co., Ltd.	Alvinston	Alvinston
Armstrong Bros.	Fletcher	Fletcher
Atlas Brick Co., Ltd.	30 Toronto St., Toronto	Milton Heights
Baird, H. C. and Son	Park Hill	Park Hill
Bechtel Reid Co.	148 Essex St., Waterloo	Waterloo
Bay of Quinte Brick Works	Belleville	Belleville
Bennet, Robert	Dunnville, Box 21	Dunnville
Bond and Bird	Woodstock, R.R. No. 5	Woodstock
Booth Brick & Lumber Co., The	New Toronto	Etoabec
Brampton Pressed Brick Co.	Brampton	Brampton
Broadwell, B. and Son	Kingsville	(Near) Kingsville
Brownscombe, H. & Sons	Box 47, Cargill	Cargill
Campbell, Neil F.	R.R. No. 1, West Lorne	West Lorne
Canadian Pressed Brick Co., Ltd.	Rm. 36, Sun Life Bldg., Hamilton	Bartonville
Chapman, John	Napanee	Napanee
Cheeseman, Peter	670 King St. W., Hamilton	Hamilton
Cooksville Shale Brick Co., Ltd.	26 Queen St. E., Toronto	Cooksville
Cooper, W. H.	104 Clyde Bldg., Hamilton	Hamilton
Cornhill James & Sons, Ltd.	Grand Ave. E., Chatham	Chatham
Crang, Jethro	202 Oakwood Ave., Toronto	Toronto
Crawford Bros.	451 King St. W., Hamilton	Hamilton
Curtin, Frank	R.R. No. 4, Lindsay	Lindsay
Curtis Bros.	Peterboro	Peterboro
Dalton, Maurice	R.R. No. 3, Dresden	Dresden
DeLaplante, J. E.	Dawes Rd., Coleman P.O., Toronto	Dawes Road
Deller Bros.	R.R. No. 2, Norwich	(Near) Norwich
Dockhart Brick & Tile Works	Arnprior	Arnprior
Dolan, John	R.R. No. 2, Watford	Watford
Dominion Sewer Pipe and Clay Industries, Ltd.	Swansea	Aldershot
Don Valley Brick Works	714 Dominion Bank Bldg., Toronto	Todmorden
Dublin Brick & Tile Yard	Dublin	Dublin S.
Elliott, Charles	Bluevale	Bluevale
Elliott, Wm.	Glenannan P.O.	Glenannan
Elliott, James, Jr.	519 Wellington St., Sault Ste. Marie	E. Korah Tp.
Erie Clay Products, Co.	Port Dover	Port Dover
Foreman, Stephen	R.R. No. 5, St. Mary's	St. Mary's
Fort William Brick & Tile Co.	Fort William	W. Fort William
Fox, Geo. J.	Box 243, Dresden	Dresden
Fraser, Charles & Leith	Blyth	Blyth
Frid Brick Co., Geo.	Main St. W., Hamilton	Hamilton
Frid Bros.	Macklin St. & Dundas Road, Hamilton	Hamilton
Frontenac Floor and Wall Tile Co., Ltd.	Box 214, Kingston	Kingston
Gardiner, Wm.	Blenheim	Blenheim
Godfrey, Thomas & Co.	Carleton Place	Carleton Place
Grigg, Wm.	Thedford	Thedford
Haines, W. H. J.	53 Wellington St., Toronto	Tamworth
Hallatt, Herbert & Son	Box 93, Comber	Comber
Hallatt, Wm. S.	Merlin	Merlin

The Clay Products Industry—Brick and Tile—Continued

Name	Address	Location
ONTARIO—Continued.		
Halton Brick Co.	28 Symes Rd., Toronto.	(Near) Terra Cotta.
Hamilton Pressed Brick Co.	Kensington Ave. S., Hamilton.	Hamilton.
Hill, A. W.	R. R. No. 1, Coatsworth.	Stevenson.
Hill, James S. & Son.	Box 124, Madoc.	Madoc.
Hill, Aaron.	Essex.	Essex.
Hinde Bros.	134 Northlands Ave., West Toronto.	West Toronto.
Hircock Bros. & Co.	Bowmanville.	Bowmanville.
Hitch, D. A.	Frie St. N., Ridgetown.	Ridgetown.
Hitch, Thos.	1st Ave., Box 254, St. Thomas.	St. Thomas.
Hodder, J. H.	Dutton.	Dutton.
Holland, Wm. and Son.	Box 20, Ruscomb.	Ruscomb.
Howlett, Fred.	Box 3, Petrolia.	Petrolia.
Interprovincial Brick Co. of Canada, Ltd.	30 Toronto St., Toronto.	Cheltenham.
Jackson Bros.	290 Rawdon St., Brantford.	Brantford.
Janes, D. A.	R. R. No. 1, Mt. Brydges.	Mt. Brydges.
Jamieson Lime Co.	Renfrew.	Renfrew.
Jasperson B. Brick & Tile Yards.	Kingsville.	Coatsworth.
Jervis, John.	Dorchester Station.	Dorchester Station.
Johnson, James, Sr.	R. R. No. 3, Pembroke.	Pembroke.
Kerr, Frederick.	Crediton.	Crediton E.
Kerr and Pettman.	Goderich.	Ben Miller.
Koebel, Joseph Z.	St. Clements.	St. Clements.
Kruse Bros.	Seaforth.	Tuckersmith.
Kuhn, Henry J.	Centralia.	Crediton E.
Labey and Son.	Foxboro.	Foxboro.
Lindsay, Earl.	R. R. No. 2, Wallaceburg.	Tupperville.
Lisbon Brick & Tile Yard.	R. R. No. 1, Wellesley.	Lisbon.
Lowes, Gordon.	R. R. No. 3, Chatham.	Chatham East.
McCoomb, Chester.	Denfield.	Elginfield.
McCormick Bros.	R. R. No. 5, Watford.	Kingsford Junction.
McCrie, T. J.	Kincardine.	Kincardine.
McGregor & Gammage.	R. R. No. 2, Dresden.	Dresden.
McIvor Bros.	Division St., Cobourg.	Cobourg.
McMahon, Robert.	R. R. No. 2, Kerwood.	Strathroy.
Mackay Bros.	Dutton.	Dutton.
Martin, David, Estate.	Thamesville.	Thamesville.
Merkleys, Ltd.	9 Fraser Bldg., Ottawa.	Billings Bridge.
Middleton, C.	Wyoming.	Wyoming.
Midland and Penetanguishine Brick Works.	Box 143, Penetanguishine.	Penetanguishine.
Milton Pressed Brick Co., The.	Milton.	Milton and Streetsville.
Miner, M. F.	Kingsville.	Kingsville.
Missouri Tile Yard (W. H. Deller).	Thorndale, R. R. No. 4.	Thorndale.
Moscow Brick and Tile Works.	R. R. No. 1, Greenock.	Riverdale.
National Fire Proofing Co.	601 Dominion Bank Bldg., Toronto.	Waterdown.
New, Edward.	133 George St., Hamilton.	Hamilton.
O'Dell Bros.	R. R. No. 1, Ingersoll.	Ingersoll.
Ollman Bros.	Macklin St., Box 241, Hamilton.	Hamilton.
Ontario Paving Brick Co., Ltd.	Weston Rd. South, West Toronto.	S. Toronto.
O'Reilly, T. E.	320 Bay St., Ottawa.	Hogs Back.
Ottawa Brick Mfg. Co., Ltd., The.	53 Queen St., Ottawa.	Hogs Back.
Ott Brick & Tile Mfg. Co., Ltd., The.	21 King St. E., Kitchener.	Kitchener.
Owen Sound Brick Co., Ltd., The.	859-2nd Ave. E., Owen Sound.	Owen Sound.
Parks, Henry W.	Box 477, Dresden.	Dresden.
Paxton & Bray.	230 Queenston St., St. Catharines.	St. Catharines.
Pears, James and Son.	200 Eglinton Ave. W., Toronto.	Toronto.
Pembroke Brick Co., The.	Pembroke.	Pembroke.
Phillips, Thomas & Son.	R. R. No. 2, Lucknow.	St. Helens.
Phinn Bros.	238 Briscoe St., London.	London.
Phippen & Field.	150 Dawes Rd., Toronto.	Toronto.
Piggott, G. E., & Co.	20 Guestview Ave., Mt. Dennis.	Mount Dennis.
Port Credit Brick Co., Ltd., The.	Port Credit.	Port Credit.
Port Rowan Brick & Tile Co.	Port Rowan.	Port Rowan.
Price and Cumming.	Salisbury Ave., Humber Bay.	Humber Bay.
Price, John, Ltd.	395 Greenwood Ave., Toronto.	Toronto.
Price and Smith.	458 Greenwood Ave., Toronto.	Toronto.
Provincial Brick Plant.	Parliament Bldg., Toronto.	Mimico.
Red Star Brick & Tile Yard (W. H. Barnhardt).	Stratford.	Stratford.
Richardson, Jas. & Son.	Kerrwood.	Kerrwood.
Reid, Jas.	R. R. No. 3, Belmont.	South Dorchester.
Russell, Jos.	40 Blake St., Toronto E.	Toronto E.
Russell Shale Brick Ltd.	100 Standard Bank Bldg., Ottawa.	Russell.
St. Joseph Brick & Tile Yard.	Zurich.	Zurich.
Shale Products Ltd.	Inglewood.	Inglewood.
Smith, Alex. & Son.	R. R. No. 2, Dutton.	Dutton.
Snelgrove, A.	Beaverton.	Beaverton.
Sproat, Wm. M.	R. R. No. 4, Seaforth.	Seaforth.
Standard Brick Co., Ltd., The.	363 Broadview Ave., Toronto.	Toronto.
Steele, Edwin.	Vankleek Hill.	Vankleek Hill.
Stevens Bros. (Huntsville Brick Co.).	Box 308, Huntsville.	Huntsville.
Staples Brick & Tile Co.	Staples.	Staples.
Streetsville Brick Co., Ltd., The.	Streetsville.	Streetsville.
Stroh, M. C.	Conestogo.	Conestogo.
Sun Brick Co., Ltd.	32 Toronto St., Toronto.	Todmorden.
Superior Tile Co., Ltd.	428 Victoria Ave., Port William.	Slate River.
Tilbury Brick & Tile Co.	Tilbury.	Tilbury.
Tope, Richard, Estate.	171 Queen St., S., Hamilton.	Hamilton.

The Clay Products Industry—Brick and Tile—Concluded

Name	Address	Location
ONTARIO—Concluded.		
Toronto Brick Co., Ltd.	60 Victoria St., Toronto	Milton.
Tweed Brick & Tile Works	Tweed	Tweed.
Wagstaff, Charles	R.R. No. 4, Lindsay	Lindsay.
Wagstaff, A. H. & Co.	336 Greenwood Ave., Toronto	Toronto.
Waite, John E.	Foresters Falls.	Foresters Falls.
Wallace R. & Sons	Box 305, North Bay	North Bay.
Warwick Brick Works	647 Grosvenor St., London	London.
Watson Brick Co.	Crediton	Crediton.
Whitby Brick & Clay Products Co., Ltd.	Whitby	Whitby.
Wilson, S. & Sons	R.R. No. 2, Paisley	Lovet.
Winch Bros.	Paisley	Paisley.
Windsor Brick & Tile Co.	201 Exchange Bldg., Windsor	(Near) Kingsville.
Woodslee Brick & Tile Yards	South Woodslee	Woodslee.
Wright, John C.	Proton Station	Proton.
Wright, Geo. & Sons	Comber	Comber.
MANITOBA—		
Alsip Brick, Tile & Lumber Co., Ltd.	200 Tribune Bldg., Winnipeg	Winnipeg.
Balmoral Brick Co., Ltd.	214 Avenue Bldg., Winnipeg	Balmoral.
McArthur, J. D. Company, Ltd.	1003 McArthur Bldg., Winnipeg	Lac du Bonnet.
Marion, Joseph A.	Box 30, St. Boniface	Plunguet St., St. Boniface.
Sidney Brick & Clay Works, Ltd.	Sidney	Sidney.
Snyder, A. & Company, Ltd.	Box 1401, Portage la Prairie	Portage la Prairie.
SASKATCHEWAN—		
Bruno Clay Works, Ltd.	Bruno	(Near) Bruno.
Christian Community of Universal Brotherhood, Ltd., The	Box 122, Verigin, Sask.	Yorkton.
Dominion Fire Brick and Clay Products, Ltd., The	Box 99, Moosejaw	Claybank, Sask.
Elliott, W. H. & Son	1320-3rd Ave. N., Saskatoon	N. Saskatoon.
Estevan Coal and Brick Co., Ltd., The	Estevan	Estevan.
Meota Brick Co.	Meota	Meota.
Saskatchewan Penitentiary	Prince Albert, Sask.	Penitentiary, Prince Albert.
Shand Coal and Brick Co.	Shand	Shand.
ALBERTA—		
Acme Brick Co., Ltd., The	125 Alberta Block, Edmonton	Cannell.
Alberta Brick Co., Ltd.	10936-123rd St., Edmonton	Cannell.
Bruce, John	Commerce	Lethbridge.
Canada Cement Co., Ltd.	Canada Cement Co. Bldg., Phillips Sq., Montreal, Que.	Sandstone.
Collins, Peter	307-15th Ave. W., Calgary	Cochrane.
Crandell Pressed Brick & Sandstone Co.	607 McLean Block, Calgary	Brickburn.
Gas City Brick Co., Ltd.	Box 656, Medicine Hat	Medicine Hat.
Little, J. B. & Sons	Water St., Riverdale, Edmonton	Water St., Riverdale.
Redcliff Brick and Coal Co., Ltd.	Box B. 5, Redcliff	Redcliff.
Redcliff Pressed Brick Co., Ltd.	Box 87, Redcliff	Redcliff.
Redcliff Premier Brick Co., Ltd.	Box C 2, Redcliff	Redcliff.
Zuchkam, Mike	Box 11, Smoky Lake	Smoky Lake.
BRITISH COLUMBIA—		
Armstrong Brick Works	Armstrong	Armstrong.
Bazan Bay Brick & Tile Co.	Bazan Bay N. Saanich, Vancouver Island	Bazan Bay.
Christian Community of Universal Brotherhood, Ltd., The	Brilliant	Grand Forks.
Clayburn Co., Ltd.	304 Credit Foncier Bldg., Vancouver	Kilgard.
Enderby Brick Co., Ltd.	Enderby	Clayburn.
Gabriola Shale Products Ltd.	104 Moodie Blk., Victoria	Enderby.
Humber Brick Co.	740 Topaz Ave., Victoria	Gabriola Is.
Johnstone & Co., Ltd.	Kamloops	Victoria.
Port Haney Brick Co., Ltd., The	846 Howe St., Vancouver	Near Kamloops.
Victoria Brick Co., Ltd.	Douglas St., Victoria	Port Haney.
		Victoria.

The Clay Products Industry—Clay Sewer Pipe

NOVA SCOTIA—		
Dominion Iron and Steel Co., Ltd.	Sydney	Sydney
Standard Clay Products, Ltd.	New Glasgow	New Glasgow.
QUEBEC—		
Standard Clay Products, Ltd.	St. John's	St. John's.
ONTARIO—		
Dominion Sewer Pipe and Clay Industries, Ltd.	Swansea	Swansea.
Hamilton and Toronto Sewer Pipe Co., Ltd., The	Wentworth St. N., Hamilton	Hamilton.
Ontario Sewer Pipe and Clay Products, Ltd.	Mimico	Mimico.

The Clay Products Industry—Firebrick and Fireclay

Name	Address	Location
NOVA SCOTIA—		
Dominion Iron and Steel Co., Ltd.....	Sydney.....	Sydney
Intercolonial Coal Mining Co., Ltd.....	Westville.....	Westville.
QUEBEC—		
Canada Firebrick Co., Ltd.....	371 Aqueduct St., Montreal.....	Montreal.
*Montreal Terra Cotta Co., Ltd.....	511 St. Catharines St. West, Montreal	Lakeside.
ONTARIO—		
Algoma Steel Corporation Ltd.....	Sault Ste. Marie.....	Sault Ste. Marie.
*Bailey, Geo., & Co.....	321 Albany St., Toronto.....	Toronto.
National Fire Proofing Co. of Canada, Ltd.....	601 Dominion Bank Bldg., Toronto..	Aldershot.
ALBERTA—		
Alberta Clay Products, Ltd.....	Box 672, Medicine Hat.....	Medicine Hat.

The Clay Products Industry—Kaolin and other Clays

NOVA SCOTIA—		
Nova Scotia Steel and Coal Co., Ltd.....	Sydney.....	Shubenacadie.
QUEBEC—		
Canadian China Clay Co., Ltd.....	Room 37-43 Victoria St., Toronto..	Amherst-Labelle Co.

The Clay Products Industry—Stoneware and Pottery

NEW BRUNSWICK—		
Foley Pottery, Ltd.....	St. John.....	St. John.
QUEBEC—		
*Canadian Potteries, Ltd.....	2 Longueuil St., St. John's.....	St. John's.
*Canada Stoneware Works.....	Iberville.....	Iberville.
*Dominion Sanitary Pottery Co., Ltd.....	189 St. James St., St. John's.....	St. John's.
ONTARIO—		
*Campbells Sons, B.....	100 Locke St., S., Hamilton.....	Hamilton.
*Canadian General Electric Co.....	212 King St. West, Toronto.....	Peterborough.
*Canadian Porcelain Co., Ltd.....	Paradise Rd., Hamilton.....	Hamilton.
Dawes, John and Sons.....	1967 Yonge St., Toronto.....	Toronto.
Foster Pottery Co.....	Main St. W., Hamilton.....	Hamilton.
ALBERTA—		
Canada Pottery, Ltd.....	Medicine Hat.....	Medicine Hat.
Medalta Stoneware, Ltd.....	Medicine Hat.....	Medicine Hat.

*Imported clays only.

The Lime Industry

NEW BRUNSWICK—		
Peters, C. H. & Sons, Ltd.....	Ward St., St. John.....	Torreyborn.
Provincial Lime Co., Ltd.....	Box 968, St. John.....	Lawlor's Lake.
Purdy and Green.....	323 Main St., St. John.....	St. John.
Randolph and Baker, Ltd.....	Randolph.....	Randolph.
Setson, Cutler & Co., Ltd.....	Campbellton.....	Indianatown, St. John.
QUEBEC—		
Armand and Beaudry.....	Joliette.....	Joliette.
Baron, Adolphe.....	St. Dominique de Bagot.....	St. Dominique de Bagot.
Beauregard, Delphis.....	North Stukely.....	North Stukely.
Boivin, Arthur.....	Pont Rouge.....	Pont Rouge.
Canada Cement Co., Ltd.....	Montreal.....	Plant No. 3, Hull.
Carswell, Robt. B.....	Bryson.....	Bryson.
Desilets, Achille.....	St. Louis de Champlain.....	St. Louis de Champlain.
Dominion Lime Co., The.....	Box 149, Sherbrooke.....	Lime Ridge.
Laurentian Stone Co., Ltd.....	250 Catherine St., Ottawa, Ont.....	Hull.
Limoges, Olivier, Estate of.....	40 rue Pouport, Montreal.....	Montreal.
McCambley, Thos.....	Kazubazua.....	Kazubazua.
Montreal Lime Co.....	31 Prenouveau St., Montreal.....	Montreal.
St. Vincent de Paul Penitentiary.....	Dept. of Justice, Ottawa, Ont.....	St. Vincent de Paul Penitentiary.
Sanche, Placide.....	St. Therese de Blainville.....	St. Therese de Blainville.
Sovereign Lime Works, Ltd.....	Delorimier Ave., and C.P.R. Tracks, Montreal.....	Montreal.
Standard Lime Co., Ltd.....	Joliette.....	St. Marc des Carrieres. St. Paul de Joliette, Que.
ONTARIO—		
Alabastine Co., Ltd., The.....	Paris.....	Elora.
American Cyanamid Co.....	511-5th Ave., New York City.....	Teeswater.
Beachville White Lime Co., Ltd.....	Beachville.....	Niagara Falls.
Bergin, Pat.....	Napanee.....	Beachville.
Brunner-Mond (Canada), Ltd.....	Canadian Bank of Commerce Bldg., Toronto.....	North Fredericksburg.
Biederman, Albert G.....	R.R. No. 1, Golden Lake.....	Anderdon Township.
Cameron, W. M.....	Carleton Place.....	Golden Lake.
Canada Lime Co., Ltd.....	177 Kent St., Lindsay.....	Carleton Place. Coboconk, Victoria Co.

The Lime Industry—Concluded

Name	Address	Location
ONTARIO—Concluded		
Chalmers Lime Works.....	689 Seventh St. West, Owen Sound..	Owen Sound.
Christie Henderson & Co., Ltd.....	201 Crown Office Bldg., Toronto.....	Hespler. Kelso and Puslinch.
Dominion Sugar Co., Ltd.....	Chatham.....	Chatham. Wallaceburg. Kitchener.
Flieler, Ed.....	Fernleigh.....	Fernleigh.
Gallagher Lime and Stone Co.....	James Street, Hamilton.....	Hamilton.
Harvey, Ltd., E.....	328 Woolwich St., Guelph.....	Rockwood.
Jamieson, J. M.....	Forrester's Falls.....	Forrester's Falls.
Jamieson Lime Co.....	Hall St., Renfrew.....	Renfrew.
Marshall, James.....	Hamilton.....	Hamilton.
O'Donohue, Michael.....	Rear Street, Campbellford.....	Seymour Tp.
Parks Bros.....	Troy.....	Troy.
Robertson Co., Ltd., D.....	201 Crown Office Bldg., 26 Queen St. East, Toronto.....	Nassagaweya Tp. Kincardine.
Smith, John.....	R.R. No. 3, Kincardine.....	Kincardine.
Standard White Lime Co., Ltd.....	Douglas St., Guelph.....	Beachville. Guelph.
Standard Chemical Co., Ltd.....	906 Drummond Bldg., Montreal. Que.....	Eganville. Cobocook.
Toronto Brick Co., Ltd.....	80 Victoria St., Toronto.....	Dolly Varden.
Toronto Lime Co., Ltd.....	26 Queen St., Toronto.....	Warton.
Vogan, Samuel.....	Gould St., Warton.....	Priecville.
Weppeler, Henry.....	R.R. No. 2, Priecville.....	
MANITOBA—		
Bowman, D., Coal and Supply Co., Ltd.....	461 Main St., Winnipeg.....	Oak Point.
Gillis Quarries, Ltd.....	Spruce and Richard Sts., Winnipeg.....	Gorson.
Moosehorn Lime Co., Ltd., The.....	214 Avenue Bldg., Winnipeg.....	Moosehorn.
Winnipeg Supply and Fuel Co., Ltd.....	214 Avenue Bldg., Winnipeg.....	Stonewall.
ALBERTA—		
Frank Lime Co., Ltd.....	214 Avenue Bldg., Winnipeg, Man.....	Frank.
Loder Lime Co., Ltd.....	Kananaskis, Alta.....	Kananaskis.
Summit Lime Works.....	503-6th Avenue S., Lethbridge.....	1½ miles east of Crows Nest.
BRITISH COLUMBIA—		
Hedley Gold Mining Co., Ltd.....	Hedley.....	Hedley.
Pacific Lime Co., Ltd.....	602 Pacific Bldg., Vancouver.....	Blubber Bay, Texada Island
Rosebank Lime Co.....	602 Pacific Bldg., Vancouver.....	Esquimalt Harbour.

The Stone Quarrying Industry—Granite

NOVA SCOTIA—		
Fairview Crushed Stone Co., Ltd.....	Roy Bldg., Halifax.....	Fairview.
Hoyt, C. M.....	Middleton.....	Nictaux W.
Nova Scotia Supply Co., Ltd.....	503 Barrington St., Halifax.....	Halifax.
Rice, Elmer.....	Laurenceton.....	Nictaux W.
Rice, W. D.....	Bear River.....	"
NEW BRUNSWICK—		
Granite Street Pavement and Construction Co., Ltd.....	Evandale.....	Hampstead.
McGrattan, Henry and Sons.....	St. George.....	St. George.
Meating, Epps, Company, Ltd.....	St. George.....	"
Milne and Coutts & Co., Ltd.....	St. George.....	"
Mooney, B. and Sons, Ltd.....	112 Queens St., St. John.....	Queens County.
O'Brien and Baldwin.....	St. George.....	St. George.
Public Works, Department of.....	St. John.....	St. John.
QUEBEC—		
Bernier, Auguste.....	Roberval.....	Roberval.
Bertrand, Louis.....	41-4th St. Shawinigan Falls.....	Almaville.
Brodie's Limited.....	128 Bleury St., Montreal.....	Guenette, Mt. Johnson, Graniteville.
Brunet, Joseph.....	663 Cote des Neiges Rd., Montreal.....	Chatham Tp.
Dumas and Frere.....	Riviere à Pierre.....	Riviere à Pierre.
Duncan, Wm.....	Graniteville.....	Househill.
La Carriere Buisserie, Limitée.....	St. Sebastien.....	St. Sebastien.
Lacasse, J. C.....	Beebe.....	Beebe.
La Cie du Granit de Charlesbourg, Limitée.....	St. Pierre de Charlesbourg.....	St. Pierre de Charlesbourg.
Norton, S. B.....	Beebe.....	Beebe.
Rogers, Thomas.....	1701 Iberville St., Montreal.....	Montreal.
Scotstown Granite Corporation.....	Scotstown.....	Scotstown.
Stanstead Granite Quarries Co., Ltd.....	Beebe.....	Graniteville.
Tilton, Melvin.....	Beebe.....	Stanstead Tp.
Wright-Bullock.....	Beebe.....	Graniteville.
Voyer, F., and Frère.....	Riviere à Pierre.....	Riviere à Pierre.
ONTARIO—		
Abrams, J. M.....	Gananoque.....	Gananoque.
Bruce Mines Trap Rock Co., Ltd.....	Sault Ste. Marie, Mich.....	Bruce Mines.
Brown, A. C.....	Lyndhurst.....	Leeds Tp.
Campbell and Lattimore.....	Canadian Pacific Railway Bldg., Toronto.....	Findlay.
Corporation of City of Fort William.....	City Hall, Fort William.....	Fort William.
Gordon, D.....	Gananoque.....	Leeds Co.
Home, Wm.....	31 Rothesay Apt., Winnipeg, Man.....	Butler.
Mond Nickel Co., Ltd.....	Coniston.....	Drury and Lavack Tps.
Morrison Bros.....	Bancroft.....	Wollaston.
Ontario Rock Co., Ltd.....	410 Crown Office Bldg., Toronto.....	Belmont Tp.

The Stone Quarrying Industry—Granite—Concluded

Name	Address	Location
ONTARIO—Concluded		
Reeco-Hall, R.	Parry Sound	McDougall Tp.
Streets and O'Brien	47 Yonge St., Toronto	Gananoque.
BRITISH COLUMBIA—		
Campbell and Ritchie	507 Front St., Nelson	Nelson.
Canadian Pacific Railway Company	Montreal, Que.	Mountain Sub-division.
Coast Quarries, Limited	337 Hasting St., Vancouver	Granite Falls.
Gilley Brothers, Ltd.	902 Columbia St. W., New Westminster	
Granite Island Quarries, Ltd.	7th Avenue and Main St., Vancouver	Coquitlam Municipality.
Nelson, City of	Box 1028, Nelson	Granite Island.
Vancouver Granite Co., Ltd.	315 Bower Bldg., Vancouver	Nelson.
Vernon Granite and Marble Company	Box 285, Vernon	Nelson Island and Gabriola.
		Yale Dist.

The Stone Quarrying Industry—Limestone

NOVA SCOTIA—		
Eastern Lime Co.	Windsor	Windsor.
Nairn, John S.	24 Whitney Ave., Sydney	Scotch Lake.
Nova Scotia Steel & Coal Co., Ltd.	Sydney, C.B.	Pt. Edward, C.B. and Orange-dale.
QUEBEC—		
Canada Carbide Co., Ltd.	Power Bldg., Craig St. W., Montreal	Fedford.
Canada Cement Company	Montreal	Hull.
Cousineau, Alderic	848 rue du Rosaire, Montreal	Montreal.
Dequire Quarry Company	Suite 2, 207 St. James St., Montreal	St. Laurent.
DeLormier Quarry Company	1952 Iberville St., Montreal	Montreal.
Deraiche, Frank	L'Anse à la Barbe	Gaspé.
Deschambault Quarry Corporation	52 rue St. Paul, Quebec	St. Marc (Portneuf).
Deschambault Stone Co., Ltd.	St. Marc des Carrieres	St. Marc des Carrieres.
Dussault, Art.	St. Marc des Carrieres	
Dussault, A. W. & Co.	St. Laurier	Mt. Laurier.
Gagnon, Martin	3595 rue St. Herbert, Montreal	Montreal.
Gravel, Ed. L.	Chateau Richer	Chateau Richer.
Institution des Souds, Muets	3600 rue St. Laurent, Montreal	St. Laurent.
Kennedy Const. Co., Ltd.	310 Shaughnessy Bldg., Montreal	St. Francois de Sales.
Lapierre, J. O.	830 Des Carrieres, Montreal	St. Vincent de Paul.
Lapointe, Jos.	74 Montée St. Laurent, Montreal	St. Laurent.
Lapointe, Elzear	St. Dominique	St. Dominique.
Laurentian Stone Co., Ltd.	Ottawa	Hull.
Leclercier, Victor	Cap St. Martin	Cap St. Martin.
Mahoney and Rich.	88 Bank St., Ottawa	Merivale Rd.
Maisonueuve Quarry Co., Ltd.	2855 Rosemont Blvd., Montreal	Montreal.
Martineau, O., & Son, Ltd.	371 Marie Anne Est., Montreal	St. Marc (Portneuf).
Montreal Crushed Stone Co., Ltd.	590 Union Ave., Montreal	St. Vincent de Paul.
Montreal Quarry Ltd.	800 Belle Chasse St., Montreal	Central Park, Montreal.
Naud, Jos. D.	St. Marc des Carrieres	St. Marc des Carrieres.
O'Connor Bros.	Huntingdon	Huntingdon.
Penitentiary, Dept. of Justice, St. Vincent de Paul Penitentiary	Ottawa	St. Vincent de Paul.
Quinlan Cut Stone, Ltd.	4414 St. Catherine St., Westmount	Montreal.
Roberge Carriere, Ltd.	Chateau Richer	Chateau Richer.
St. Laurent Quarry, Limited	Cap St. Martin	Cap St. Martin.
Tremblay, Nap.	Joffre Ave., Hull	Hull.
Verreault, Elzear	191 rue du Pont, Quebec	Giffard.
Villeroy, The, Quarry Co., Ltd.	848 du Rosaire St., Montreal	Montreal.
ONTARIO—		
Belton, Peter	St. Catharines	Grantham.
Bergin, Pat.	Napanee	Napanee.
Britnell & Co., Ltd.	Rear C.P.R. Yonge St. Station, Toronto	Burnt River.
Brunner Mond Canada Ltd.	Canadian Bank of Commerce Bldg., Toronto	Anderdon Tp.
Cayuga Stone Company	21 Central Chambers, Ottawa	North Cayuga.
Caldwell Bros.	Limebank	Gloucester Tp.
Canada Crushed Stone Corporation, Ltd.	Dundas	West Flamboro Tp.
Carleton, County of	No. 71½ Sparks St., Ottawa	Osgoode-Gloucester-Nepean.
Cook & Son, J. S.	Warton	Amabel Tp.
Crushed Stone, Ltd.	47 Yonge St., Toronto	Kirkfield.
Crystalline Milling Company	120 Bank St., Toronto	Herschell.
Farmer, Geo. & Sons	450 Bertrand Ave.	Osgoode Tp.
Farr, L. G.	Haileybury	Haileybury.
Foster, R. R.	278 Echo Drive, Ottawa	City View.
Gallagher Lime & Stone Co.	James St., Hamilton	Barton Tp.
Gavard, L. H.	12 Delormier St., Hull	Gloucester Tp.
Gosselin, Chas.	Quarries	"
Gow, James	Fergus	Fergus.
Hagersville Contracting Co., Ltd.	Hagersville	Walpole Tp.
Hagersville Crushed Stone Co.	Hagersville	Oneida Tp.
Hagersville Quarries, Ltd.	4 Flora St., St. Thomas	Walpole Tp.
Haldimand County Good Roads System	Hagersville	Rainham & Walpole Tp.
Hanover Cement & Stone Co.	157 Bay St., Toronto	Walkerton.
Halliday, Fred	297 Booth St., Ottawa	Gloucester Tp.
Hildreth, Chas.	R.R. No. 4, Hamilton	Barton Tp.
Innerkip Stone Quarry	Innerkip	Innerkip.

The Stone Quarrying Industry—Limestone—Concluded

Name	Address	Location
ONTARIO—Concluded		
Kingston Penitentiary.....	Portsmouth.....	Portsmouth.
Kirby, T. Sidney Co., Ltd.....	213 Sussex St., Ottawa.....	Gloucester Tp.
Lally, M.....	Smithville.....	South Grimsby.
Law Construction Co., Ltd., The.....	107 Hillsdale Ave., Toronto.....	Bertie Tp.
Lincoln County of, Rd. Department.....	St. Catharines.....	North Grimsby.
Longford Quarry Co., Ltd.....	Longford Mills.....	Rama Tp.
MacDonald, A. G.....	Bronte.....	
MacDonald, A. N.....	Bronte.....	
Markus, Wm., Ltd.....	Pembroke.....	Pembroke Tp.
Marshall, Jas.....	Hamilton.....	Barton Tp.
McNeely, D. R.....	Carleton Place.....	Carleton Place.
Mills, Jas.....	Napanee.....	Napanee.
Oliver Rogers Stone Co., Ltd.....	341 Fourth Ave. E., Owen Sound.....	Owen Sound.
Ontario Hydro Electric Commission.....	Toronto.....	Walkerton.
Ontario Reformatory Industries.....	Parliament Bldgs., Toronto.....	Guelph Tp.
Ontario Stone Corporation, Ltd.....	611 Excelsior Life Bldg., Toronto.....	Whitoff.
Ottawa Improvement Commission.....	53 Queen St., Ottawa.....	Ottawa.
Perkins, Geo. A.....	830-5th Ave. W., Owen Sound.....	Owen Sound (West Hill)
Pichard, L.....	Bronte.....	
Pt. Anne Quarries, Ltd.....	Ft. of Jarvis St., Toronto.....	Thurlow Tp.
Public Highways, Dept. of.....	Toronto.....	
Robertson, D. & Co.....	201 Crown Office Bldg., Toronto.....	Nassagaweya Tp.
Robillard, H. & Son.....	195 Nicholas St., Ottawa.....	Gloucester Tp.
Roddy & Monk.....	24 Elm Rd., Kingston.....	Kingston.
Standard White Lime Co., Ltd.....	15 Douglas St., Guelph.....	Beachville.
Thames Quarry Co., Ltd., The.....	St. Mary's.....	St. Mary's.
Walker Bros.....	Thorold.....	Stamford Tp.
Wallace, R. & Sons.....	116 Patrick St., Kingston.....	Kingston.
Wattam, Geo. H.....	Shelburne.....	Amamath Tp.
Webber, John.....	Dunnville.....	Dunn Tp.
Webster, Jas. S.....	2 Augusta St., Galt.....	Galt.
Wehman, John.....	251 Drison St., Kingston.....	Kingston.
Wentworth, County of.....	Court House, Hamilton.....	Waterdown.
Woodhouse Crushed Stone Co., Ltd.....	Port Dover.....	Woodhouse Tp.
Wentworth Quarry Co., Ltd.....	Binmount.....	Saltfleet Tp.
MANTOBA—		
Tyndall Quarry Co., Ltd.....	1591 Erin St., Winnipeg.....	Winnipeg.
Winnipeg, City of.....	Winnipeg.....	Stony Mountain.
BRITISH COLUMBIA—		
Cons. Mining & Smelting Co., Ltd.....	Trail.....	Fife.
Land Lime, Ltd.....	Armstrong.....	Armstrong.
Powell River Co., Ltd.....	Powell River.....	Texada Island.
Wing, A. B.....	Vancouver.....	Swamp Pointe.

The Stone Quarrying Industry—Marble

QUEBEC—		
Wallace Sandstone Quarry, Ltd.....	120 St. James St., Montreal.....	Philipsburg, Missisquoi County.

The Stone Quarrying Industry—Sandstone

NOVA SCOTIA—		
Wallace Sandstone Quarries, Ltd.....	120 St. James St., Montreal.....	Wallace.
NEW BRUNSWICK—		
Dobson, Frank L.....	Dorchester.....	Dorchester.
Miramichi Quarry Co., Ltd.....	Quarryville.....	Quarryville.
QUEBEC—		
Kirby Co., Ltd., Sidney.....	213 Sussex St., Ottawa.....	Two Mountains.
Richelieu Quarry Co.....	St. Jean.....	St. Luc.
ONTARIO—		
Rogers, F. & Co.....	1193 West Queen St., Toronto.....	Terra Cotta.
ALBERTA—		
Oliver, Wm. & Co.....	1823-15th St. W., Calgary.....	Calgary.
BRITISH COLUMBIA—		
Haddington Quarry Co., Ltd.....	1571 Main St., Vancouver.....	Haddington Island.

The Stone Quarrying Industry—Slate

QUEBEC—		
British Canadian Marble Co., Ltd.....	St. Joseph de Beauce, Que.....	St. Joseph de Beauce.
Slate Products Co. of Canada, Ltd.....	Southam Bldg., Montreal.....	Melbourne Tp.

SEP 13 1983

